MAY 10, 1945

American Machinist

The Veteran Comes Home

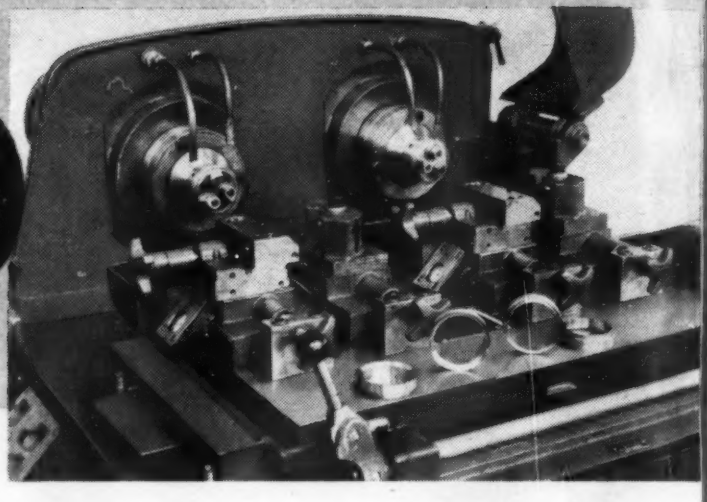
CONSOLIDATED-VULTEE'S PLAN FOR EX-SERVICEMEN

FINISHING 6 TIMES FASTER WITH BORE-MATICS

R v. 893 May-June 1945

THE OLD WAY — 2184 MAN HOURS — 91 MACHINES

THE HEALD WAY — 360 MAN HOURS — 15 MACHINES



HEALD BORE-MATIC 47A in an automatic cycle, turns, chamfers, straddle faces valve seat inserts two at a time. *A good example of Precisioneering*

Valve Seat Production Maintained with 15 Bore-Matics—91 Machines Released for Other Work

This tremendous saving—83⅓% reduction in man-hours and equipment for machining valve seat inserts—was effected solely thru installation of Heald Bore-Matics. Operations required to finish inserts on O.D. and sides were cut from 3 to 1... number of machines from 91 to 15...manhours from 2184 to 360 per 24-hour day.

Besides these substantial economies in costs and time, valuable floor space also was saved and vital machines released for other work.

Here's only one example of HEALD PRECISIONEERING at work. If you plan to jump the gun on postwar competition, now's the time to scrutinize operations in your own plant. Chances are that worthwhile savings can be obtained by borizing on Bore-Matics. Let us analyze your problem. We'll be glad to work with you.

THE HEALD MACHINE COMPANY
WORCESTER 6, MASS.

Tech

HEALD...*first with the finest*

INTERNAL AND SURFACE GRINDING MACHINES • BORE-MATIC PRECISION FINISHING MACHINES

American Machinist

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MAJOR ARTICLES

The Veteran Comes Home ..... *Dr. F. M. Amaral* 99
Thread Gage Instruction ..... *Montgomery Schuyler* 103
Shop Shots 104
Milling Cutters and How to Use Them ..... *M. Martellotti* 106
Magazine Feed for Screw Machines ..... *Harry L. Giwosky* 109
Stock Removal by Lapping ..... *Norman Gray* 110
Boring and Tapping Machines Finish Bomb Bodies 112
Arc Welding Doubles Shell Case Output 115
Flashwelding Crew Nacelle Spars ..... *J. L. Graux* 116
Contractors Can Speed Plant Clearance 125
Britain Guards Against Waste ..... *W. J. Hargest* 126
Improved Safety Devices Curtail Shop Accidents 130

PRACTICAL IDEAS

Grinding Large-Radius Cams ..... *George Kocian* 119
Stud Threading Diehead ..... *R. A. Schultz* 119
Three Hole Locating Gage ..... *M. W. Bossman* 120
Rivet Spinning Attachment ..... *Walter L. Bland* 121
Guard for Air Blown Chips ..... *Donald R. Tryer* 121
Forming Tight Skin-Plate Joints ..... *Robert F. Rider* 122
Using Engine Lathe as a Cam Miller ..... *Harry Fleisher* 122
Slotter Toolholder ..... *Eugene P. Dwyer* 123
Bench Press Speed Slowed ..... *Peter Ketelsen* 124
Power Hacksaw Angle Cutting Attachment ..... *Eilef Ausen* 124

NEWS OF THE INDUSTRY

Gaging Business 140a
Detroit Letter 140c
Washington Bulletin 140e
Spotting the Air News 140f
Names in the News 140g
Obituaries 140h

DEPARTMENTS

Editorial 97
Reference Book Sheet 137
Shop Equipment News 141
Trade Publications 156

CHANGE OF ADDRESS ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

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American Machinist Chips

In This Issue . . . Practically every plant executive should be interested in the story by Dr. F. M. Amaral, San Diego Division of Consolidated Vultee Aircraft Co. This article describes the program of placing disabled veterans of World War II into jobs for which they are best suited. Typical example of the efficiency of the program is represented by the fact that 100 discharged veterans interviewed during January were hired. Placement is administered by shop foremen and department heads, aided by medical assistants.

Our Editor-across-the-sea, Bill Hargest, describes how Britain guards against waste . . . the story featuring installation of oil and chips salvage facilities in the large Rolls Royce aircraft engine plant.

Also in this issue is the 12th and final installment in the series on milling cutters written by M. Martellotti of Cincinnati Milling. This has been an outstanding series of authoritative articles and we hope you have found them interesting and useful.

Salesmanship . . . *We are indebted to a friend in the advertising business, handling industrial accounts, for the following yarn. We are assured that this actually happened to a young man who is now an executive of a well-known gage company. Here goes:*

A Detroit gage company hired a young salesman back in the fast expanding 1942 period.

An ex-candy super salesman, young Jim had no previous mechanical experience. But the courage of youth is justifiably proverbial. He was raring to go. Where were the prospects?

The president of the company managed to hold 'Jim at the plant long enough to sell him on the idea they had the best of equipment, the smartest of engineers and the know-how only obtained in many months of gage making.

Then off ran Jim . . . all set to show how easy it was for a *good* salesman to corral the big orders.

First stop, Rochester. First call, at the biggest plant. Naturally! And being a *gage* salesman, he was welcomed by the p. a. with understandable 1942-style cordiality.

Prints for needed gages were immediately brought forth.
"Can you make this?" queried the p. a., picking out a tough one.
"Certainly!" replies Jim, with full confidence in best of equipment, smartest of engineers, et al.
"How about this one?"
"Easy, for us!"
"And this one?"
"We can do it!"
"And this one?"
"As good as done!"

So it went. Soon more than a score of blueprints were stacked in front of enthusiastic Jim, already to carry his proud catch back to Detroit. Visions of praise and promotion bolstered even higher his soaring ego.

"Just a minute!" he was sarcastically warned in typical 1932 p. a. fashion, "You don't know your gages from a hole in the ground."

"Okay—I guess you're right, but how did you know?"

"Those prints you're ready to rush away with include the plans for my new garage, young man!"

P. S. He got an order, gage demand being what it was.

Super Job . . . In a recent issue of the Wright Aeronautical publication *Trade Winds* are told some of the highlights of the mammoth task of converting the company's Cincinnati engine plant.

The new setup will be for making the 2,200 horsepower Cyclone 18 power plants, and involves not only completely different plant layouts but also the installation of hundreds of new machine tools and other pieces of equipment.

Probably the most spectacular feature of this program is that while all the moving and rearranging is going on, the company is continuing to build and ship out Cyclone 14's.

Steel Plant Lingo . . . We got quite a chuckle out of a recent publicity release from American Iron & Steel Institute explaining that when steel men discuss slips and bloomers they aren't necessarily talking about lingerie, and when they speak of a bell it is likely to be a bell that doesn't ring. They are just talking steel lingo—a colorful lingo made up mostly of homemade definitions for regular English words but which also is salted with strange and curious terms like skelp, sull, waste-waster, etc.

We suppose all you gentlemen know what these terms mean so we won't bother you with definitions.

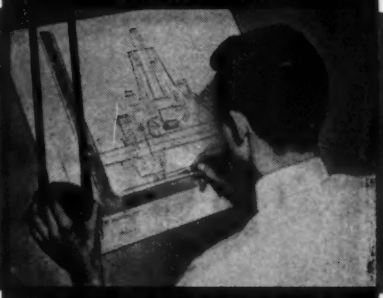
Congratulations . . . In case you missed it in the April 26 issue of *American Machinist*, we would like to call attention to the celebration early last month of the 80th Anniversary of Gleason Works. Some 7,000 employees, their families and guests, attended a gala open house.

Remember Iwo Jima . . . To the current barrage of publicity being given our next War Loan, we would just like to add our small voice asking one and all to look at, think about and act upon the official insignia shown below.

to help you

1 SOLVE BEVEL GEAR DESIGN PROBLEMS

BEVEL GEAR DESIGN ENGINEERING

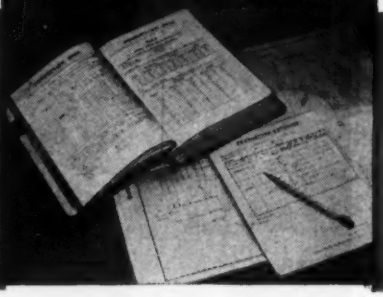


2 OBTAIN THE RIGHT EQUIPMENT FOR YOUR NEEDS

BEVEL GEAR EQUIPMENT ENGINEERING

3 ESTIMATE YOUR PRODUCTION TIME AND COSTS

BEVEL GEAR PRODUCTION ENGINEERING



the COMPLETE Gleason Engineering Service . . .

. . . when you have a problem involving bevel gear design or production, the solution can be secured from the Gleason Works—without obligation. Highly skilled engineers, backed by the company's *80 years' experience* in designing bevel gears and building bevel gear machinery, will study your bevel gear drive designs. Profitable improvements are often suggested. Correct gear cutting machines, tools and auxiliary equipment to meet your specific manufacturing requirements will be recommended. Further, we'll prepare for you estimates of production time, based upon actual shop practice. By utilizing this complete service you can save time and money.

WHAT WE NEED to help you

FOR PRODUCTION ENGINEERING

1. Blueprints of your bevel gear designs.
2. Material specifications and manufacturing tolerances.
3. Quantity of gears to be produced per month.
4. Number of working hours per month available for gear production.

FOR DESIGN ENGINEERING

1. Preliminary layouts or prints of proposed bevel gear drive designs.
2. Type of drive.
3. Horsepower and speed required.
4. Type of loading (constant, intermittent or shock).
5. Driving member and direction of rotation.

For informative literature on the design, manufacture and application of straight, spiral and Zerol bevel and hypoid gears, write on your firm's letterhead.

GLEASON

GLEASON WORKS

Builders of Bevel Gear Machinery for Eighty Years

1000 UNIVERSITY AVENUE, ROCHESTER 3, N. Y., U. S. A.

CINCINNATI 1-18 MILLER AUTOMATICALLY SAWS 48

CINCINNATI

CINCINNATI *1-18 Plain Automatic Miller. Write for Catalog M-848 which contains complete specifications. For a brief description of this machine, look in Sweet's Catalog File for Mechanical Industries.*

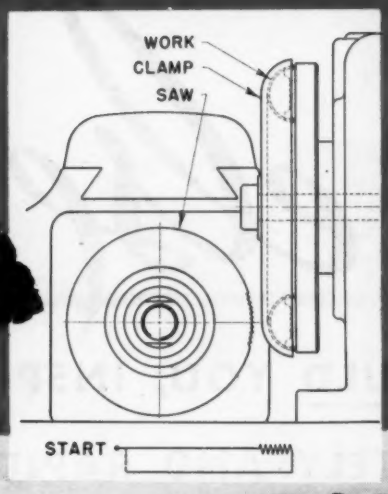
● Sawing operations on a milling machine are not unusual, but in this instance, the application is out of the ordinary. Here a CINCINNATI 1-18 Plain Miller automatically saws 48 accurately spaced slots in steel torus rings. The operating cycle synchronizes the movements of the table with those of the index fixture, so that the entire operation is automatic. ¶ The work is clamped to the index fixture over a plate by means of a second plate which has 48 slots milled in its periphery. When 48 slots have been sawed, the index fixture and the cutter and machine cycle stop simultaneously for unloading and loading. ¶ The table rapid traverse of 300 inches per minute makes this setup unusually productive. Then there are other important features about this application in which you'll be interested. Our Application Engineers will be glad to talk to you concerning similar operations.

It's the lucky seventh
BUY AN EXTRA BOND!

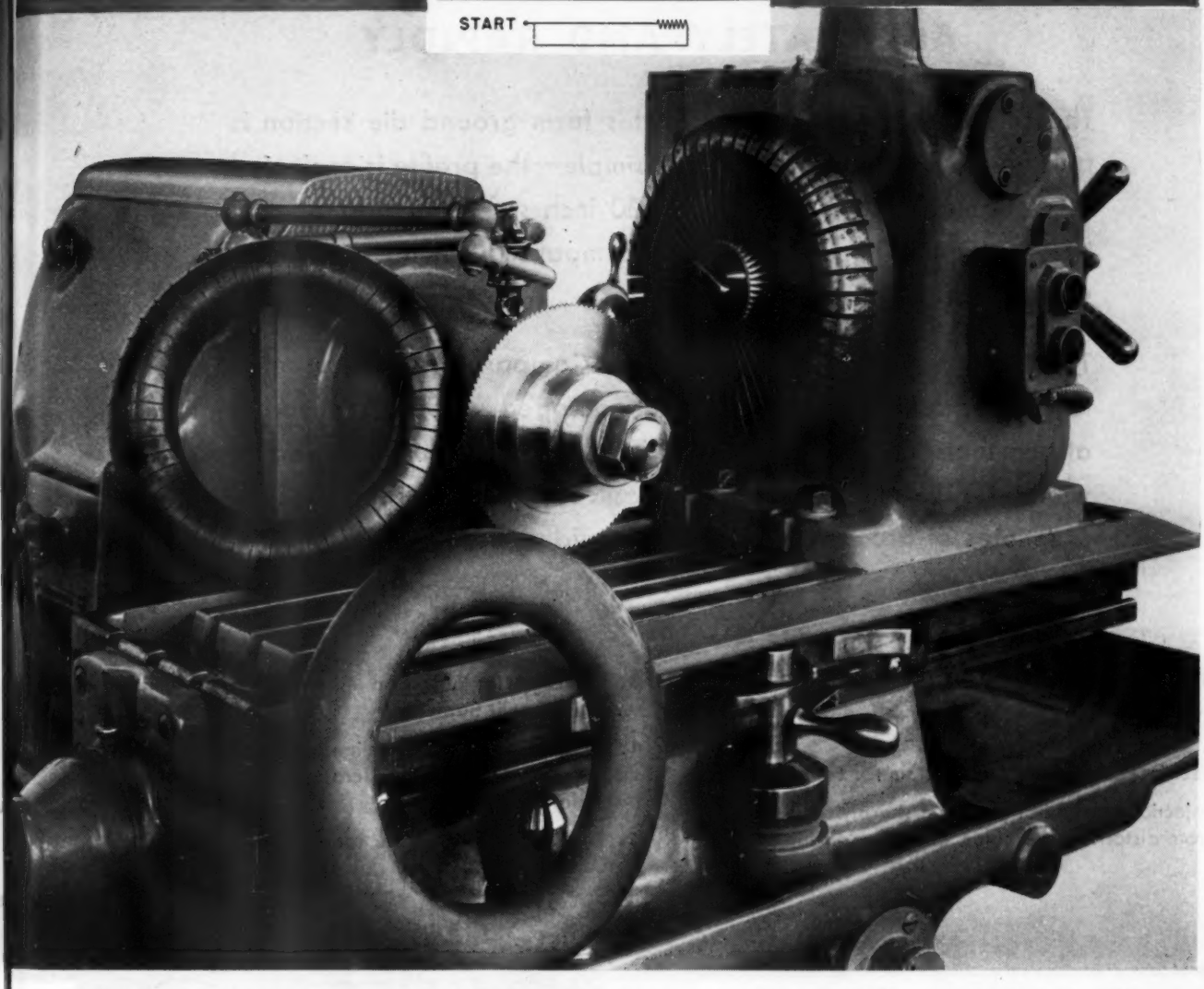
THE CINCINNATI M

MILLING MACHINES

SLOTS



Sketch of the part and cutter, with cycle diagram shown below. Cycle automatically repeats 48 times, to mill-saw 48 slots in 6.2 minutes.



CINCINNATI *1-18 Plain Automatic Milling Machine equipped with 7½° automatic Index Fixture, special Outer Arbor Support which clamps to face of the machine, and 7" diameter Metal Slitting Saw. Blank stock and sawed torus ring are shown at the left of the photograph.*

MILLING MACHINE CO. CINCINNATI 9, OHIO, U.S.

BROACHING MACHINES • CUTTER SHARPENING MACHINES

How else?

WOULD YOU, OR COULD YOU, INSPECT SUCH PARTS ACCURATELY AND RAPIDLY

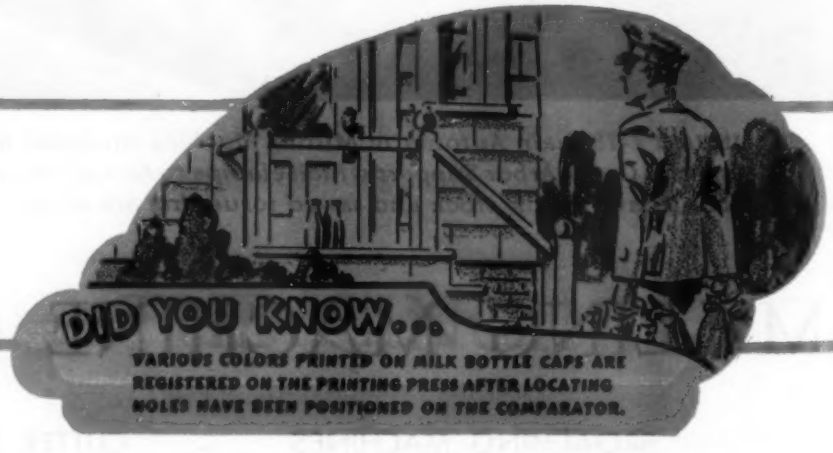
The tolerance on the profile of this form ground die section is plus or minus .0005". *Inspection is simple*—the profile is projected at 62½ magnifications upon the 30 inch screen of the Jones & Lamson Optical Comparator and compared with the accurately scribed master outline.

The Jones & Lamson Pedestal Optical Comparator is an essential to the modern tool room. When equipped with all measuring attachments, lateral or vertical dimensions can be measured to within .0001 of an inch, and angles can be measured to within 5 minutes of arc—*accurately and rapidly!*

WHEN PURCHASING EQUIPMENT FOR MEASUREMENT AND INSPECTION BY OPTICAL PROJECTION, YOU SHOULD DEMAND:

1. Precision Condensing Lens System for controlling light.
2. Projection lenses that project a sharply defined image, free from distortion and color, *anywhere on the screen.*
3. Optically Flat Reflection Mirrors *sufficiently thick* to insure *permanent* flatness.
4. Provision for positively aligning the illuminating system, staging fixtures, projection lens, mirror and screen in correct relation to each other.
5. Rigid Machine Construction.

This book "Beyond a Shadow of a Doubt" will tell you more about our Optical Comparators and what they are doing.


DID YOU KNOW...
VARIOUS COLORS PRINTED ON MILK BOTTLE CAPS ARE REGISTERED ON THE PRINTING PRESS AFTER LOCATING HOLES HAVE BEEN POSITIONED ON THE COMPARATOR.

Photograph courtesy of Star Machine & Tool Company, Cleveland, Ohio

JONES & LAMSON

MACHINE COMPANY

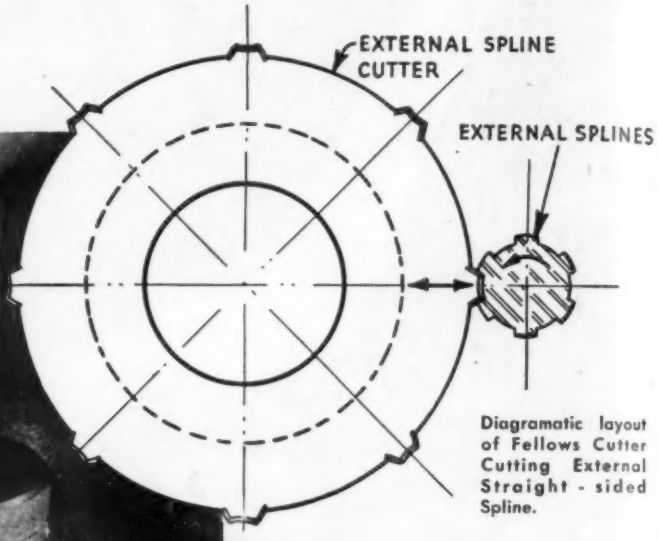
SPRINGFIELD, VERMONT, U. S. A.

OPTICAL COMPARATORS

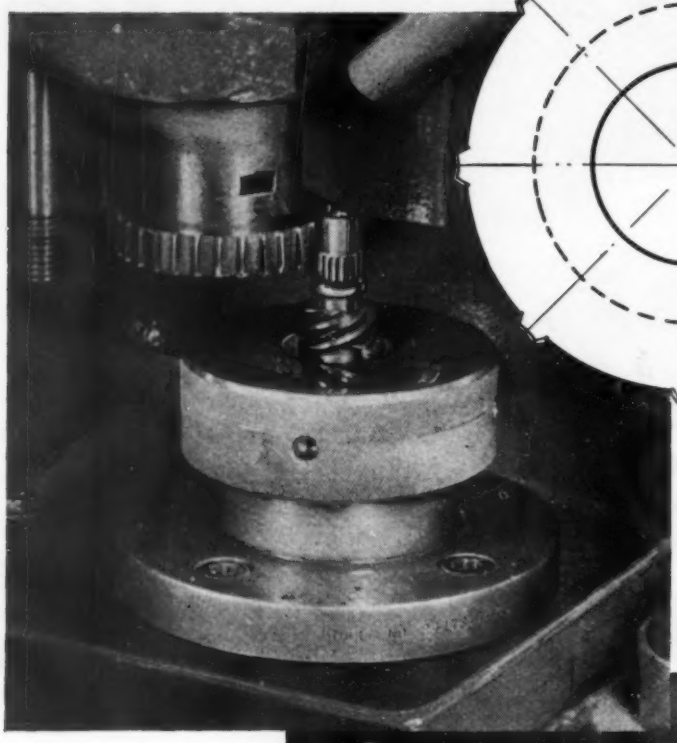
Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

BENCH COMPARATOR WITH 14" DIAM. SCREEN & MEASURING ATTACHMENTS
STANDARD BENCH COMPARATOR
BENCH COMPARATOR 14" DIAM. SCREEN
DIRECT PROJECTION COMPARATOR
STANDARD PEDESTAL COMPARATOR
PEDESTAL COMPARATOR 22" — 30" DIAM. SCREENS

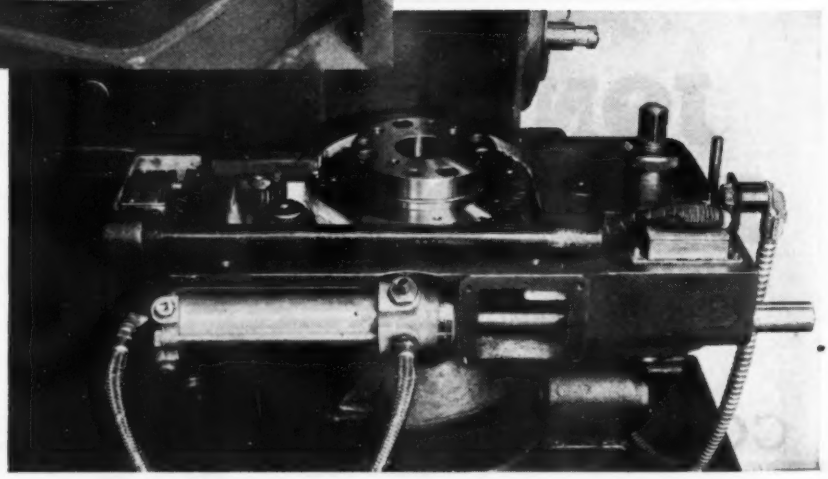
Straight-sided Splines



Diagramatic layout of Fellows Cutter Cutting External Straight-sided Spline.



Set-up on Fellows Automatic Indexing Gear Shaper Cutting External Straight-sided Splines.



Work-holding Fixture Removed to Show Automatic Indexing Mechanism.

THE FELLOWS METHOD...MACHINES AND TOOLS FOR

ON THE GEAR SHAPER?

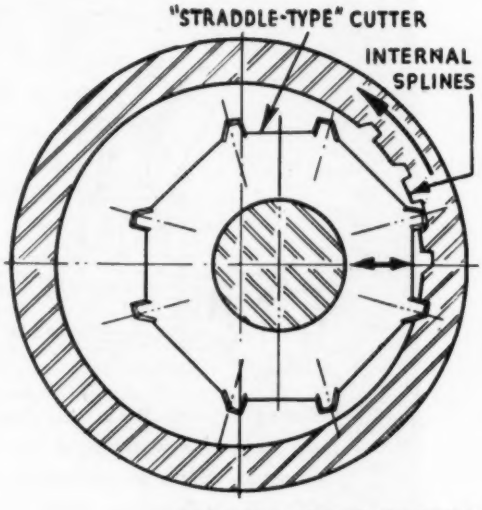
Yes, indeed!

Precision Fits Between Mating Members are Easy to Maintain at a High Production Rate on 7- or 7A-type Fellows Automatic Indexing Gear Shapers...

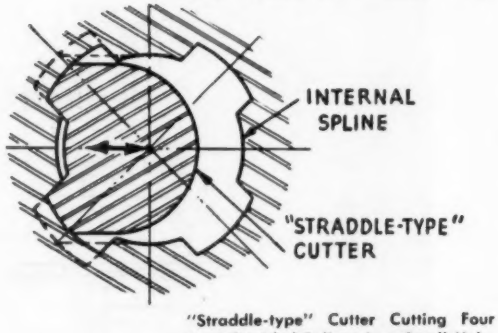
It is now possible to obtain the same degree of control over spline groove width on internal splines, as is the case with external splines. Not only that, but production costs are greatly reduced, and much longer life is obtained from the cutters. This has been made possible by a so-called "straddle-type" cutter.

The accompanying illustrations present two "straddle-type" cutters—one adapted to the cutting of a small number of splines in small holes; and the other adapted to the cutting of a larger number of splines in a comparatively larger hole. It will be observed in the case of the four-spline hole, that the same surfaces on the cutter teeth, finish both sides of the spline groove in the work in successive indexes.

This assures positive control over spline groove width, as the cutter is ground back by resharpening. Other advantages are clearly outlined in a new circular just off the press. Write for your copy. . . . The Fellows Gear Shaper Company, Springfield, Vermont—or 616 Fisher Bldg., Detroit 2, Michigan—or 640 West Town Office Bldg., Chicago 12, Ill.



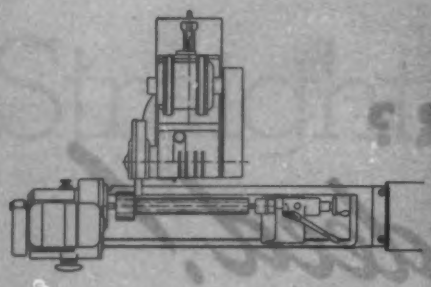
"Straddle-type" Cutter Cutting Straight-sided Splines in a Larger Hole.



"Straddle-type" Cutter Cutting Four Straight-sided Splines in a Small Hole.

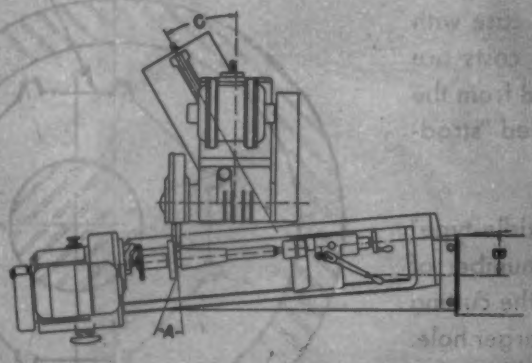
Fellows

ALL OPERATIONS FROM BLANK TO FINISHED GEAR

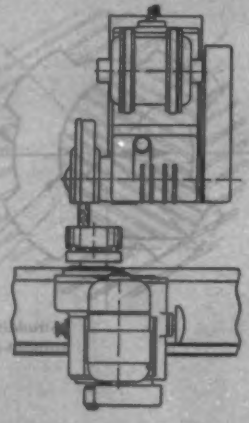


Setup for grinding a shoulder. This operation is usually done after the smaller diameter has been traverse ground to size. The wheel should be recessed to assure squareness of the shoulder.

CINCINNATI

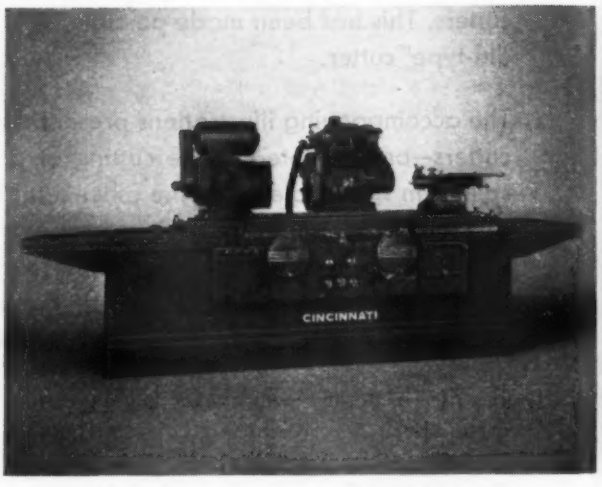


Grinding a bevel. Both the table and the swivel plate under the wheel head have been swiveled. This setup, for the steeper angles, produces a good finish and avoids waste of wheel by excessive truing.



Arrangement with chuck for face or circular grinding operations on the flat sides of parts. Table is traversed as in conventional grinding, and at about the same rate as for the corresponding diameter of cylindrical work.

The all purpose TOOLROOM GRINDER



CINCINNATI *Hydraulic Universal Grinder. These machines are available in 12", 14", 16" and 18" swings; and 36", 48" and 72" between-center lengths. All have FILMATIC Grinding Wheel Spindle Bearings. Write for Catalog G-486-1 for 12" or G-474-1 for larger sizes. A brief description will be found in Sweet's Catalog File.*

CINCINNATI

CENTER TYPE GRINDING MACHINES

An External Job. Grinding the taper, 3½" per foot, on the shank end of attachment driving gear. Notice the Internal Grinding Attachment is up and out of the way. It does not interfere with straight or tapered external work.

An Internal Job. When one of these comes along you simply pull down the Internal Grinding Attachment and tighten one bolt. Here the bore in a short shaft is ground internally to an accurate plug-gage fit.

Another External Job. Grinding the shank end of a long gun boring drill. This setup demonstrates the versatility of CINCINNATI *Hydraulic Universals in grinding the long slender parts, as well as the short stubby ones.*

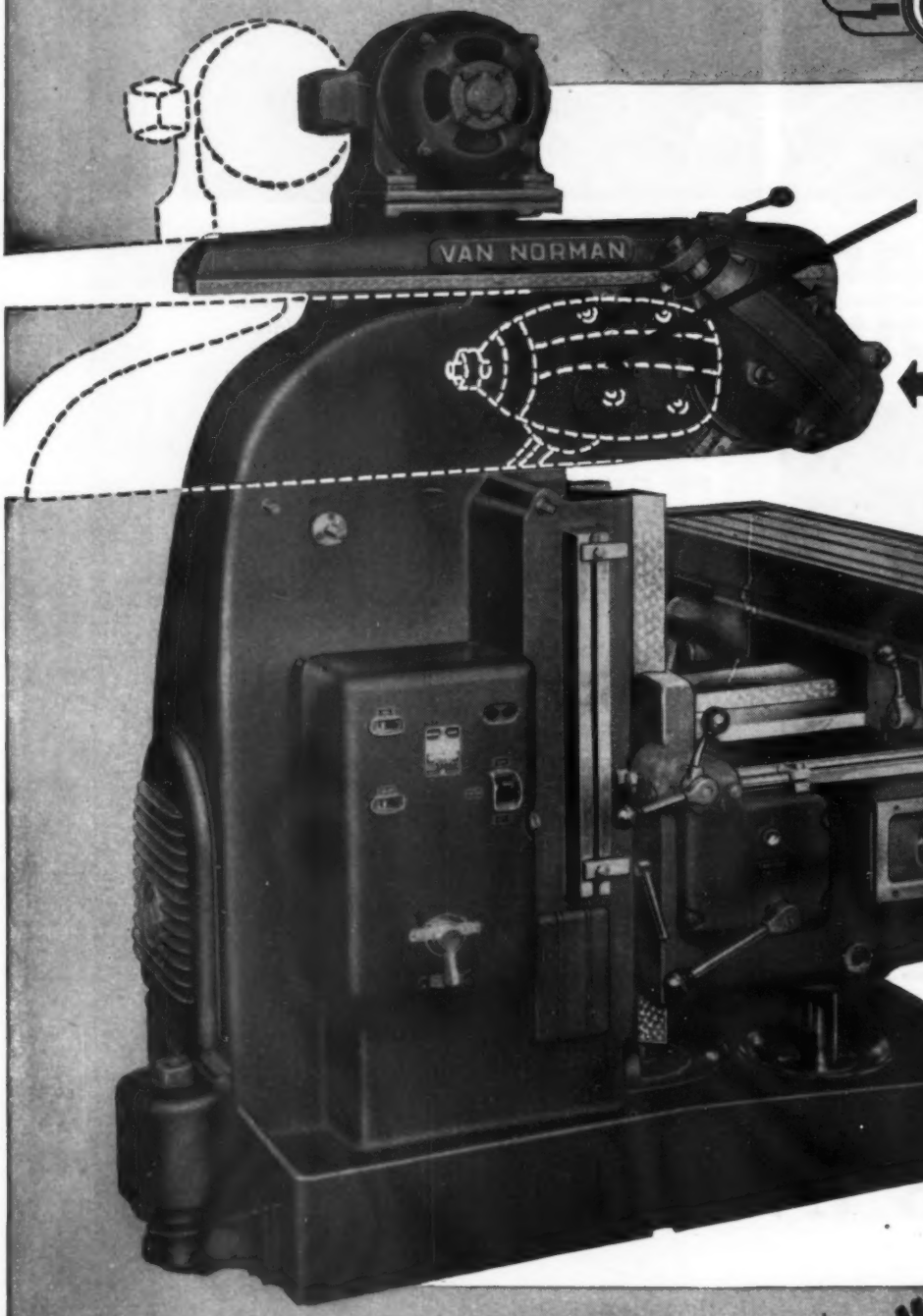
● CINCINNATI Hydraulic Universals give you everything you need in a toolroom grinder. External grinding, Internal grinding, Face grinding—from one to another easily, quickly and over a wide range of work. Your men will enjoy operating these machines because they are so easy to manipulate and turn out the kind of work every operator is proud to produce. No toolroom is well equipped without at least one CINCINNATI Hydraulic Universal Grinding Machine. ¶ Talk over your grinding operations with our engineers. They will be glad to give you the benefit of many years' experience.

GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES

VAN NORMAN



Movable ram, with an in-and-out movement over column of 19 inches, provides greater working capacity . . . increases versatility of the machine.

Adjustable cutterhead permits vertical . . . horizontal . . . or angular milling all on one machine — gives you the work range of several types of millers . . . greatly reduces work reset-ups.

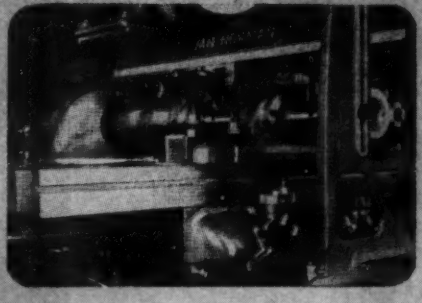
SPECIFICATIONS:
No. 26 Ram Type Universal Miller
Table: 50" x 12"
Range: 28" longitudinal, 12" across, 18" vertical
18 Speeds: 30 to 1500 r.p.m.
18 Feeds: 3/8" to 32"

"It pays to

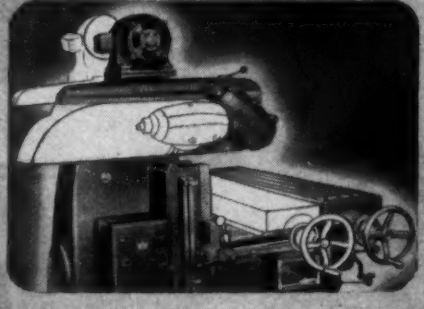
UNIVERSAL
MILLING MACHINES

VERTICAL MILLING — In the illustration, the operator is vertical milling a recess in the workpiece.

ANGULAR MILLING — Here, the operator is milling a "V" in the workpiece. Note that the set-up of the work is in the original position.



HORIZONTAL MILLING — With the head locked in the horizontal position, the machine is used for a boring and facing operation.



Adjustable cutterhead and movable ram in combination with the saddle cross feed provides maximum milling capacity and versatility.

Produce More Work with Less Man Hours

Van Norman Ram-Type Universal Millers increase machine and operator output by as much as 40%. How? By reducing idle machine time caused by work reset-ups.

With the Van Norman Universal Milling Machine, the operator changes the position of the cutterhead . . . from horizontal to angular . . . or vertical position . . . instead of the workpiece. The cutterhead is mounted on a movable ram which can be moved in or out permitting the operator to handle all milling operations, whether it be small or large work, with minimum set-ups. The net result is greater machine capacity, faster work with less possibility of errors.

In addition, such Van Norman features as — directional front and rear controls of all power feeds, solid machine rigidity, single selector speed and feed change levers, large easy-to-read dials — all add up to increased output and reduced costs.

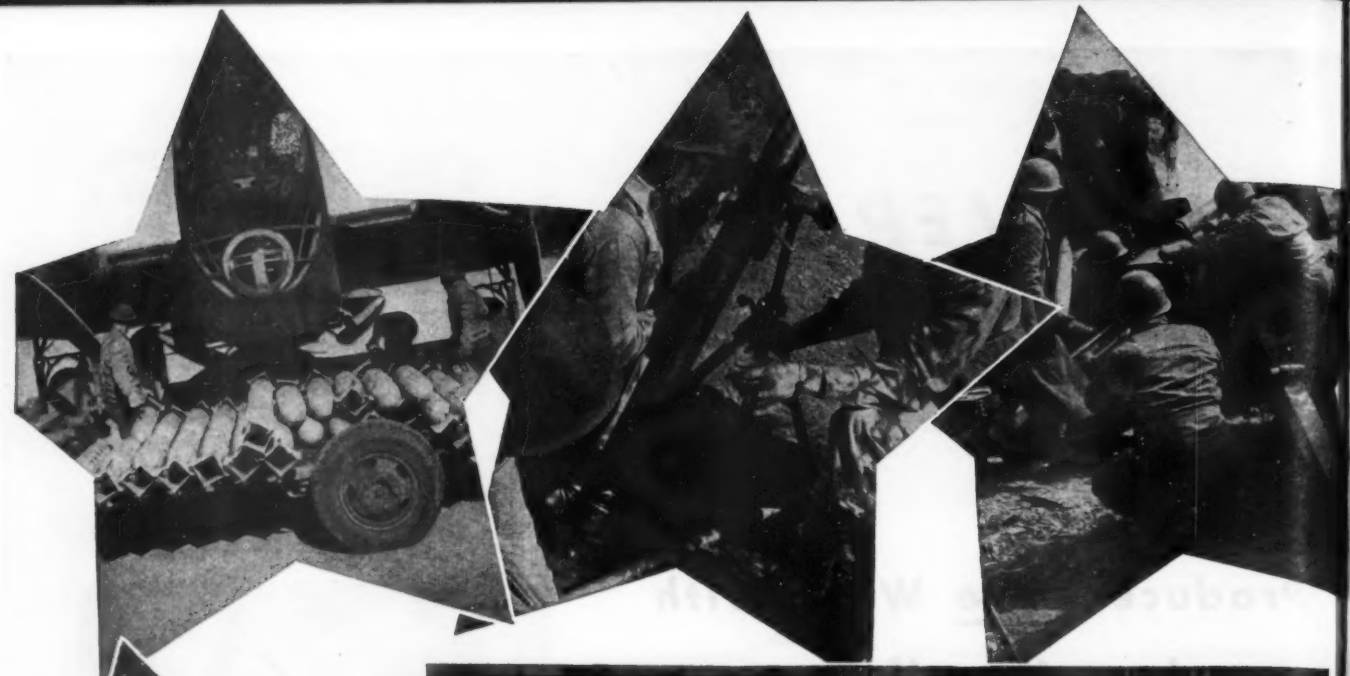
Find out about the Van Norman Ram-Type Universal Millers, today. Write for bulletin.

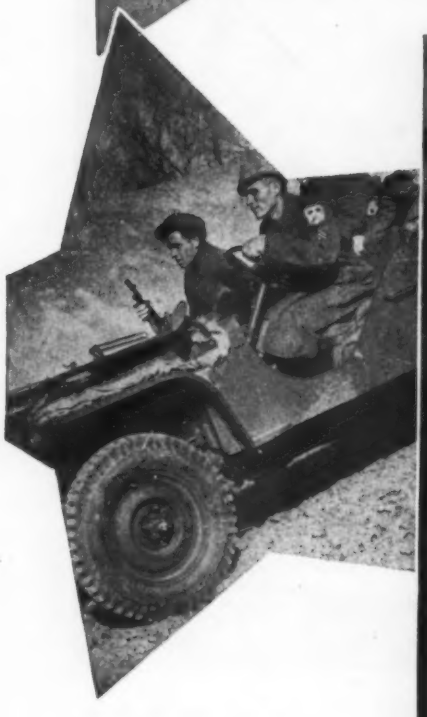
ARMY E NAVY

VAN NORMAN COMPANY

SPRINGFIELD, MASSACHUSETTS

Van Normanize





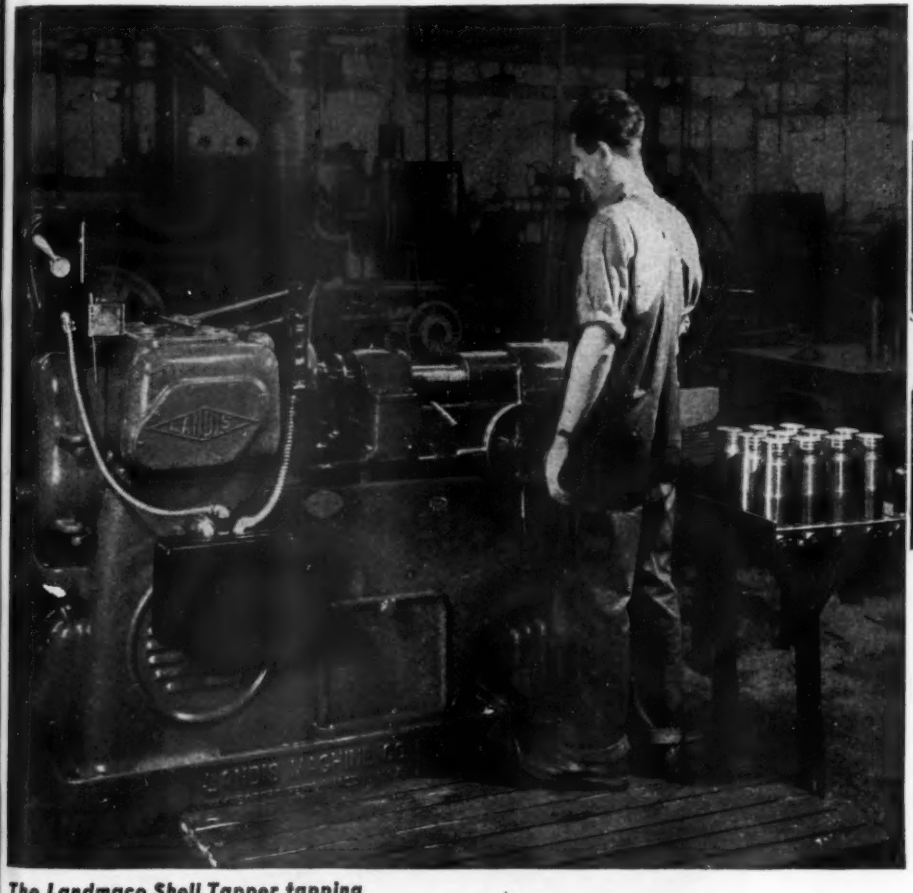
The Landmaco Threading Machine threading cartridge containers for 60 mm trench mortar shells.

LANDIS

WAYNESBORO

Serving All Units of Our ARMED FORCES

Threading operations on shells, aircraft parts, super-bombers, gun carriages, diesel engines for submarines, etc., are being performed with precision accuracy, at maximum speed, by Landis Equipment in plants all over the world.



The Landmaco Shell Tapper tapping the nose end of 75 mm shells.

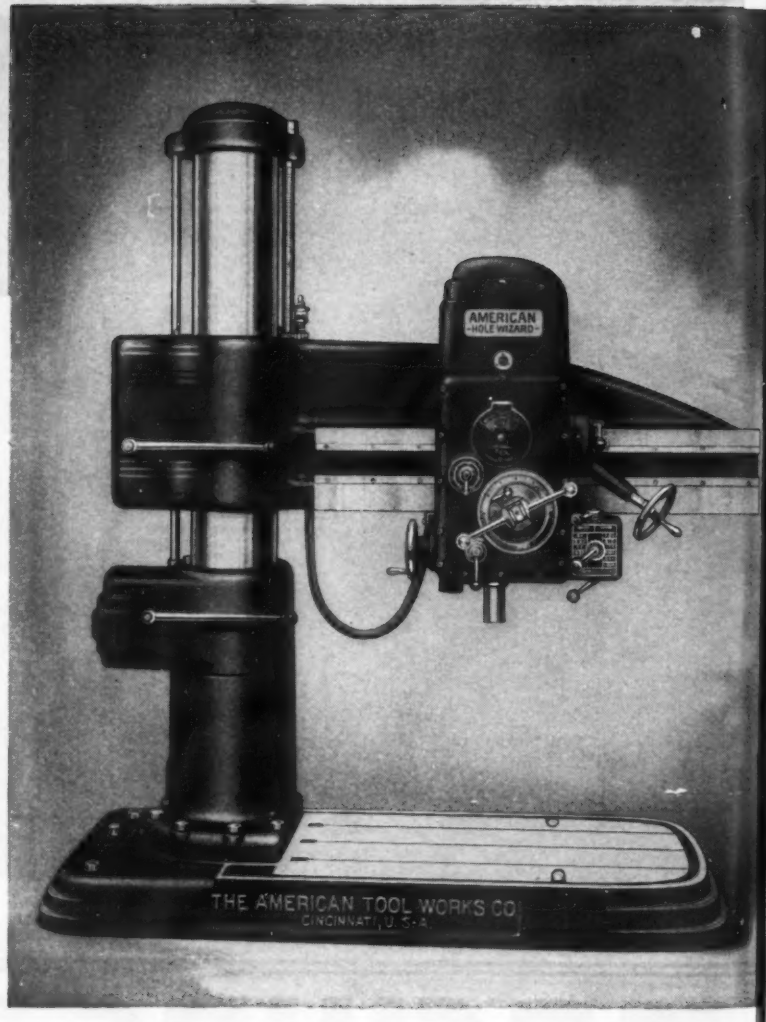
MACHINE CO.
PENNA. U.S.A.

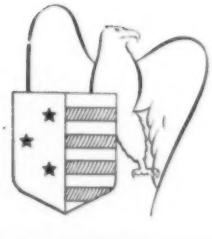
MARVELS

. . . of Speed and Maneuverability

COURTESY OF BELL AIRCRAFT CORP.

Increasing numbers of planes in the skies over our far-flung battle fronts testify to the success which American aircraft manufacturers are achieving. Helping them with all kinds of drilling, boring, facing and reaming jobs "AMERICAN" Hole Wizard Radials are proving themselves outstanding performers on the super-accurate jobs which aircraft production demands. American manufacturing skill plus "AMERICAN" Hole Wizards are a winning combination for all types of war production. Bulletin No. 310 gives all the facts. It is yours for the asking.





THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio, U. S. A.

Lathes and Radial Drills

Prepared for ACTION!

YOU'RE SURE TO GET TOP-FLIGHT DRIVE PERFORMANCE WHEN YOU SPECIFY ALLIS-CHALMERS TEXROPE V-BELTS . . . EACH BELT IS DESIGNED, TESTED AND BUILT TO SOLVE SPECIFIC DRIVE PROBLEMS

REALLY BAD OIL CONDITIONS ARE MY OBJECTIVES. I'M SUPER-7 OIL-PROOF...MADE OF SOLID NEOPRENE. GRIMY LIQUIDS DON'T BOTHER ME.
OIL
SUPER-7 STATIC-RESISTING TALKING: MY BUILT-IN CONDUCTING ELEMENT CARRIES STATIC CHARGES TO MACHINES WHERE THEY'RE GROUNDED.
HEAVY LOADS? EASY! MY STEEL CABLES ADD POWER, REDUCE STRETCH AND SLIPPAGE. I'M SUPER-7-STEEL.
90% OF ALL OIL CONDITIONS ARE A CINCH FOR ME. NEOPRENE IS MY COVER..SUPER-7 OIL-RESISTING, MY NAME.
HOT-RUNNING DRIVES ARE WHERE I SHINE. 180°F IS JUST COMFORTABLY WARM FOR SUPER-7 HEAT RESISTING. THAT'S ME.
A 1771

IT PAYS TO MAKE ALLIS-CHALMERS YOUR

V-BELT DRIVE HEADQUARTERS

Texrope Super-7 V-Belts result from the cooperative research of two great companies—Allis-Chalmers and B. F. Goodrich—and are sold exclusively by A-C.

DETROIT PUBLIC LIBRARY

Landis Tool No. 12 Centerless Grinder

Your major concern in selecting the best centerless grinder for the job is, "Will it grind more parts to closer tolerances and finer finishes?"

To find the most satisfactory answer to this question, note the new, modern design features of the Landis Tool No. 12 Centerless. Then read the actual production achievements of this remarkable machine, at the right. You'll see why the Landis Tool Centerless has won unquestioned performance leadership in this field.

LANDIS TOOL

Precision Grinders

LANDIS TOOL CO. • •

Leads in Performance

LANDIS TOOL No. 12 CENTERLESS GRINDER

New, modern features make possible the superior finishes and high production you can obtain with the Landis Tool Centerless. These include:

★ Faster stock removal to close limits and fine finish by rigid support of work in guide that extends up to center line of regulating wheel spindle.

★ Simple rheostat controlled adjustable speed drive gives speed adjustment with no interruption of the grinding cycle.

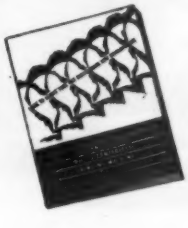
★ Manual or hydraulic traverse of regulating wheel base for rapid, accurate wheel alignment.

★ Improved construction for tilting regulating wheel base for through feed grinding.

★ Swiveling regulating wheel base for grinding tapers.

★ Quick, easy setup of single work rest for parallel or tapered work.

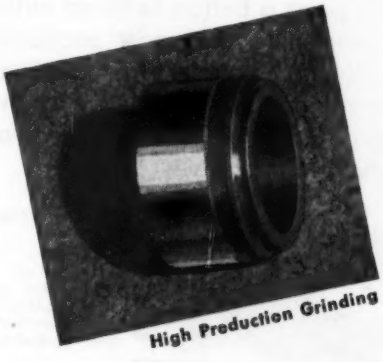
★ Single, convenient valve at operator position controls coolant for grinding and dressing.



For complete information on the No. 12 Centerless Grinder, write for your copy of Catalog T44. Landis Tool Company, Waynesboro, Pa.

Close Tolerance Grinding

Here's a remarkable example of close tolerance grinding. This plunger for a fuel injector had to be held to hairline tolerances and perfect roundness to provide an exact pressure-tight fit. The rigid construction of the Landis Tool No. 12 Centerless Grinder made possible grinding to the extreme limits required, in only 5 to 6 passes and a finish of 4 to 5 micro inches.



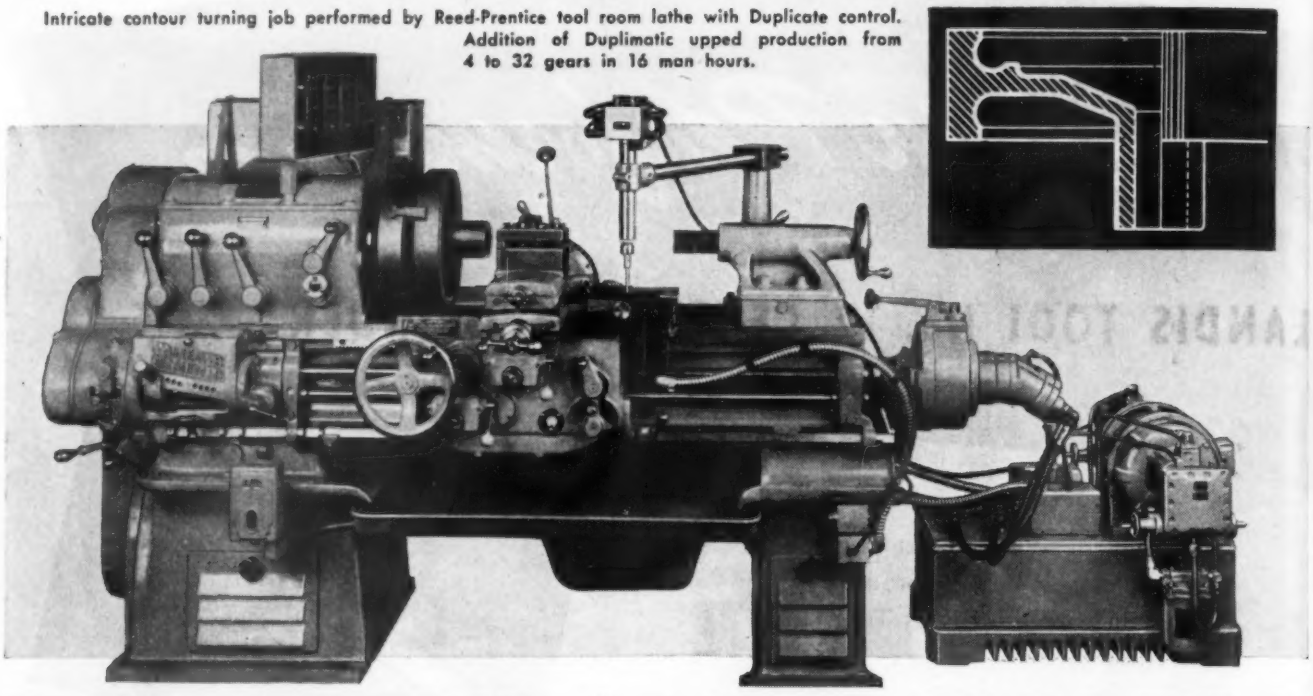
High Production Grinding

Here's a striking example of high production grinding. These bearing bushings were ground on the Landis Tool No. 12 Centerless Grinder at the rate of 27,600 parts in 8 hours. Yet tolerances were held throughout the production run to ½ thousandth! Have you a grinding job that requires volume production plus superior finishes? 20

LANDIS TOOL *Company*

WAYNESBORO, PA.

Intricate contour turning job performed by Reed-Prentice tool room lathe with Duplicate control. Addition of Duplimatic upped production from 4 to 32 gears in 16 man hours.



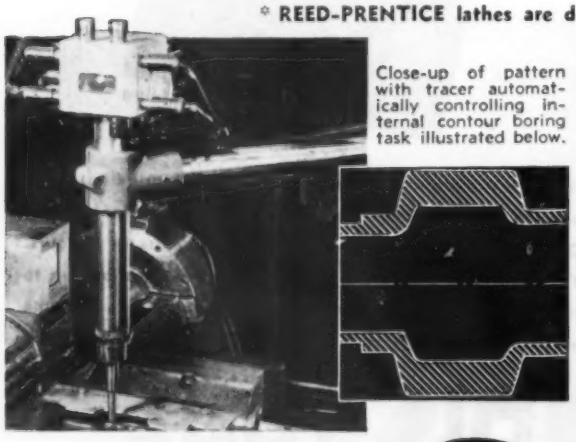
REED-PRENTICE LATHES...with *DUPLIMATIC CONTROL

ASSURE GREATER ACCURACY WITH LESS SKILLED HELP!

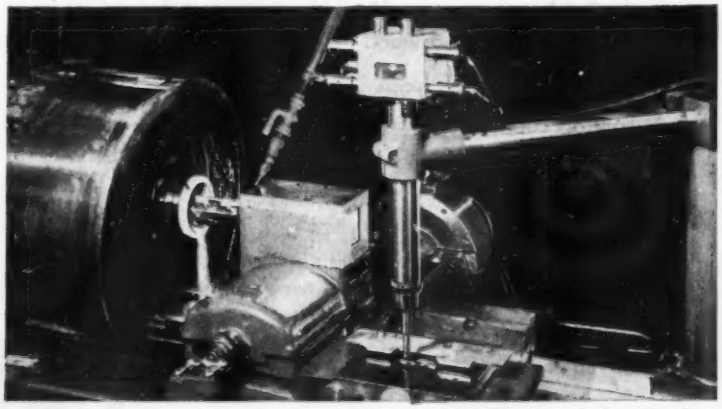
Even relatively "green" operators need merely press a button to direct automatic contour machining and mass production at tool room limits. Getting the production you need when you need it is that easy when your shop is equipped with Duplimatic-controlled Reed-Prentice lathes.

The Duplimatic turns one or two feed screws automatically, simultaneously, yet independently of each other to do contour turning or boring at speeds and accuracies beyond human capacity. Details on the Reed-Prentice quality-built machine tools equipped with Duplimatic control supplied on request.

* REED-PRENTICE lathes are designed for use with both single and double DUPLIMATIC controls.



Close-up of pattern with tracer automatically controlling internal contour boring task illustrated below.



Internal contour boring on Reed-Prentice lathe — Duplimatic controlled — produces airplane engine reduction gear pinions with accurately blended radii and smooth internal contours.

★ ★ ★ ★

MACHINE TOOLS

REED-PRENTICE CORP.

WORCESTER MASS., U.S.A.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

NEW YORK OFFICE: 75 West St., New York 6, N. Y.
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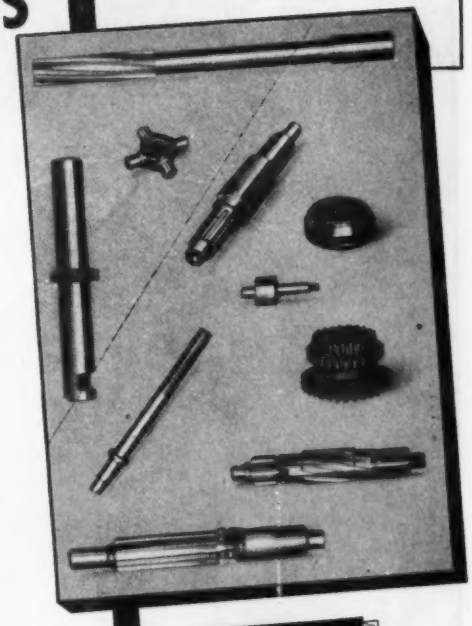
THE FITCHBURG METHOD OFFERS SPECIAL MACHINES FROM STANDARD UNITS

Fitchburg automatic multiple precision grinding offers the same profit possibilities that up-to-date shops now earn with multiple tooling and combined cutting on machined work.

Special machines mounting Standard Bowgage Head Grinding Wheel units, like the one illustrated, enable the precision grinding of two or more dimensions at a single handling. Grinding is completed within the time required for the longest single operation. On mass production work these Fitchburg grinders rapidly repay their cost.

On hundreds of parts like those shown, for machine, automotive or ordinance work, Fitchburg engineers can help you to make sure your orders are filled on time, and at the lowest possible cost. It will not obligate you to mail in your blueprints for study. Catalog shows wide range of other successful applications. Write for a copy today on your business letterhead.

When installing special grinding equipment it is important to remember that the Fitchburg Bowgage Grinding Wheelhead is a self-contained standard unit. It can be remounted on standard machines, or on new special bases, for operations other than the one originally specified. This feature protects your investment.



This book shows how to cut grinding costs... Sent free... write for it today.

FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U.S.A.

Manufacturers of—Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Bath Full Universal Grinders and Special Purpose Grinders.

NORTON Machines...
VITAL in the FIELD of

JET PROPULSION

WHEN American industry was charged with producing jet propelled planes on a production basis, new grinding problems arose. Norton engineers contributed the development of an unusual grinding machine for precision finishing the involved parts of the ingenious jet propulsion units.

This special Norton machine, combining flexibility with sturdy construction, is finishing the extremely tough and heat-resistant alloy steel used in the turbine shaft, wheel and compressor parts of the engine.

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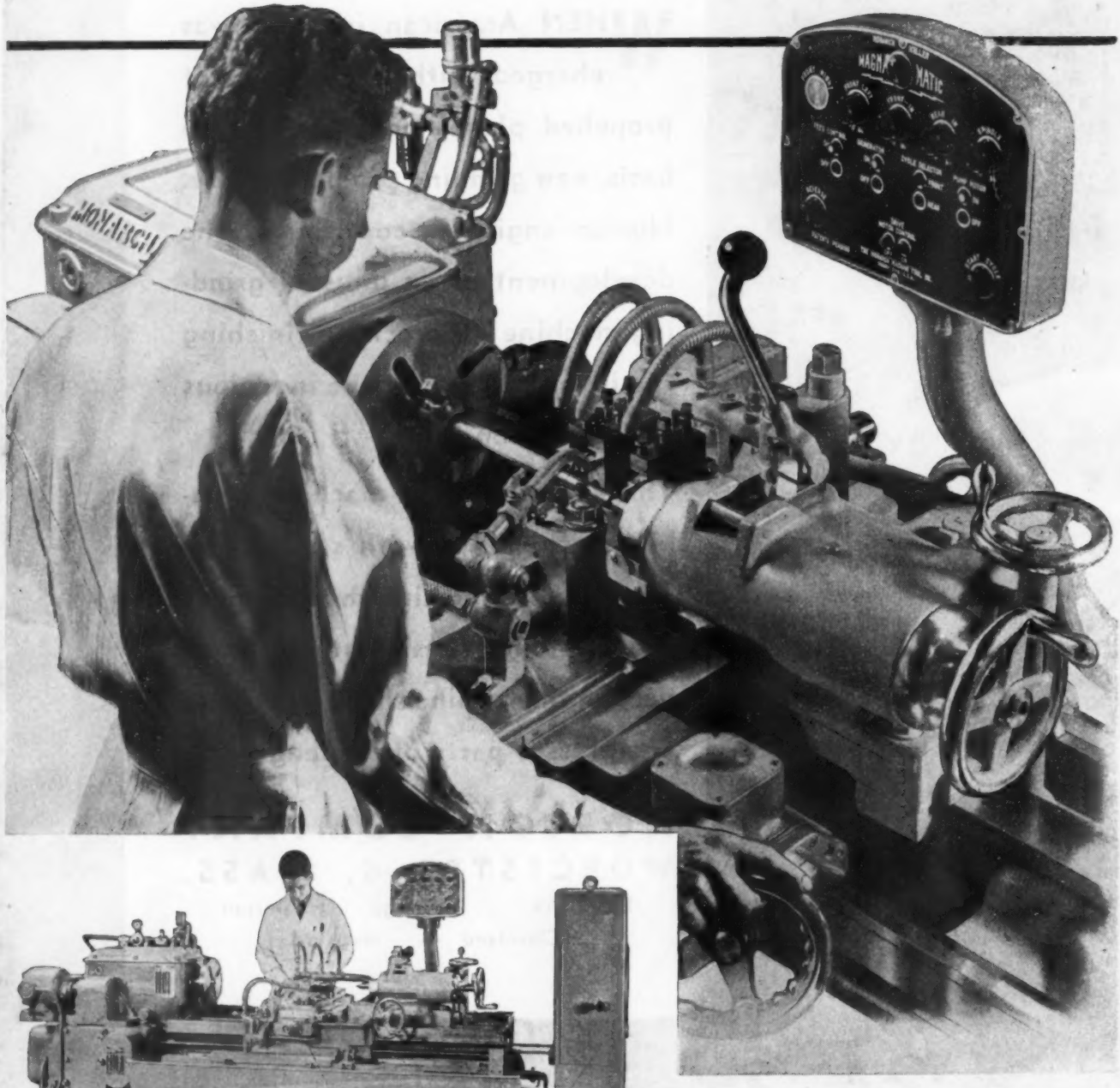
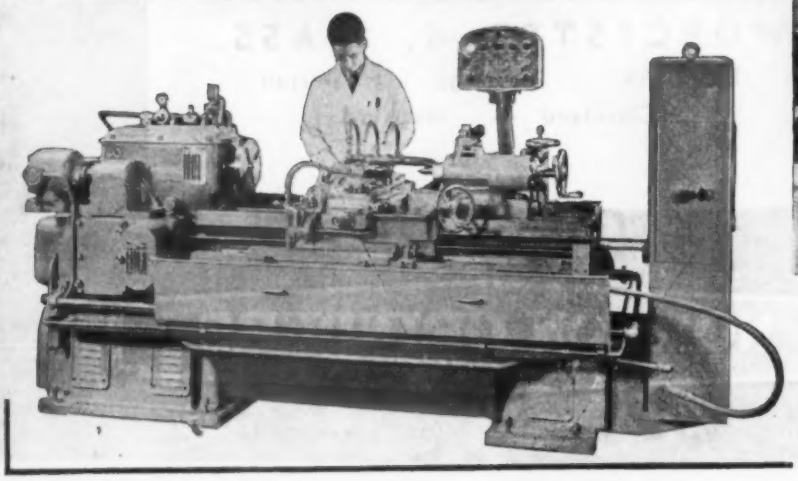
M 502

NORTON GRINDERS *and Lappers*

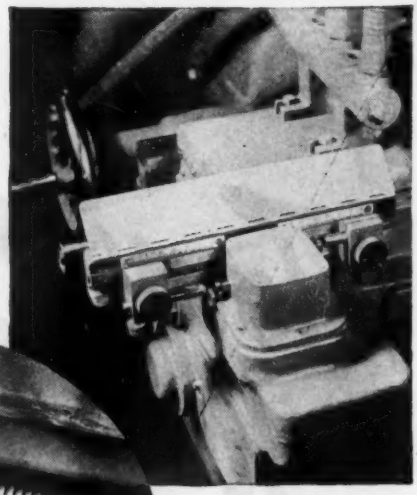
Quick setups for **on Monarch**





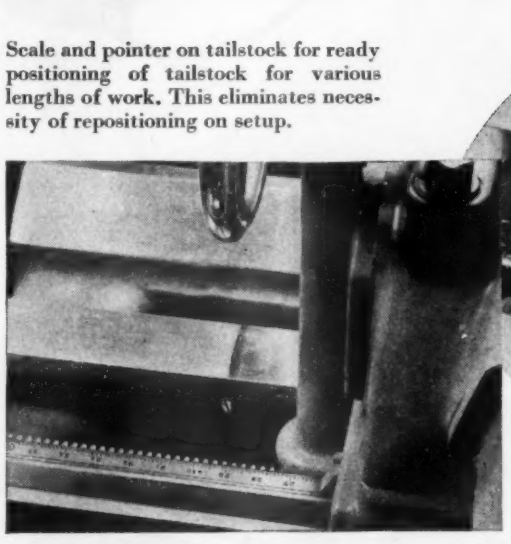
Electric controls permit automatic selection of 6 different feed rates, for faster metal removal or for varying finishes on different portions of work.

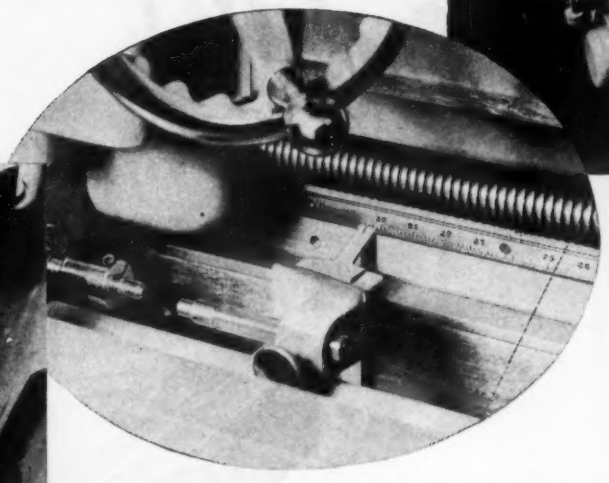
short runs Magnamatics



Another quick setup feature of Monarch Magnamatics is the finger-tip control of travel to the slides, with easy reading and accurate micrometer adjustments.

Scale and pointer on tailstock for ready positioning of tailstock for various lengths of work. This eliminates necessity of repositioning on setup.





Quick positioning of stops controlling the longitudinal travel of carriage is provided by scale pointer with micrometer finger-tip adjustment.

The facilities illustrated show how the Monarch Magnamatic provides quick, accurate setups. With setup time as low as 5 minutes in many cases, the Magnamatic can be profitably used for as few as 25 pieces, with rising economies on longer runs.

The Monarch Magnamatic is a fully automatic, all-electrically controlled, double-carriage machine for turning, boring and facing work. For 10 years it has saved time and money on peace and war production—and has been constantly improved with the advance in electrical control devices.

One button on the electric control panel starts the complete automatic cycle, and from then on the machine is 100% automatic, allowing one operator to attend two or more machines, with resulting manpower saving and production economy.

Ask the nearest Monarch office or representative to show you how you can apply Magnamatics to your turning, boring, or facing work.

THE MONARCH MACHINE TOOL COMPANY · SIDNEY, OHIO

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Phone: Garfield 2590

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Phone: Trinity 1-0426

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Phone: Wabash 2650

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Monarch Saves Time

Tomorrow's accuracy here today!

in the SCHERR OPTI-FLAT GLASS SURFACE PLATE

Here is flatness to .00005", lapped to optical accuracy with the care of an astronomical lens. Here is *maintained* flatness, too, for this heavy slab of optical glass will not *warp*, will not *wear* under usage, will not *dent* through accident, will not *burr up* even though scratched by a diamond. And if you have an idea that being glass, it must be handled tenderly, consider that the sledge hammer blow which would be required to crack a 2 or 3-inch slab of Pyrex-brand glass, would ruin or seriously damage a surface plate of any other material.

This is the Scherr glass surface plate, the foundation of really accurate measurement, the eliminator of manufacturing mistakes and rejections, the sound basis of certainty behind profitable volume production. Laboratory accuracy to fifty millionths, but in a workaday tool that requires only common shop care in its use.

Is this degree of accuracy higher than your commercial needs? Not when you consider that it may prevent errors far higher in cost. And that your shop may enjoy this accuracy at a decidedly reasonable price. Two sizes, both mounted in heavy hardwood case with protecting cover.

12" diam. 2" thick	$58.00
16" diam. 3" thick	88.00

Order direct or write for bulletin.

Other Scherr Precision Specialties

GLASS TOOLMAKERS KNEE

Essential in checking squareness of work in conjunction with the Opti-Flat. Guaranteed square within 15 seconds of arc. Can be inspected optically. Made with the same high degree of accuracy as the Opti-Flat, in one size—2½"x4"—2½"x3"—in

Clear glass $24.00

SCHERR OPTICAL FLAT

Invaluable for optical testing of contact surfaces of micrometers and snap gages, lapped surfaces of gage blocks, etc.

1¼" diam.	½" thick	. .	$10.00
2.4" diam.	0.600" thick	. .	35.00
3" diam.	0.600" thick	. .	78.50
4" diam.	0.600" thick	. .	175.00

Set of 2, thickness varying .0125—$25.00

SCHERR SODIUM VAPOR LAMP

Ideal for critical inspection. It eliminates eye-strain and promotes maximum clear vision. An indispensable aid for observing interference bands in checking surfaces with optical flats. Price, $68.50.

Write us for bulletins on the above Scherr precision equipment, or order direct.

GEO. SCHERR CO., Inc. 201 LAFAYETTE STREET NEW YORK 12, N. Y.

CTW

A CHAIN IS AS STRONG AS ITS WEAKEST LINK

●

A MACHINE IS AS GOOD AS ITS CUTTING TOOL...

●

Specify **CONTINENTAL**

The precision cutting tool must be even more accurate than the machine, the fixture, or the finished part. "Continental" cutting tools made by Ex-Cell-O (they run from a standard counterbore to all types of broaches and to special carbide-tipped tools of intricate design) are acknowledged to be among the best obtainable in design and manufacture and in actual production results.

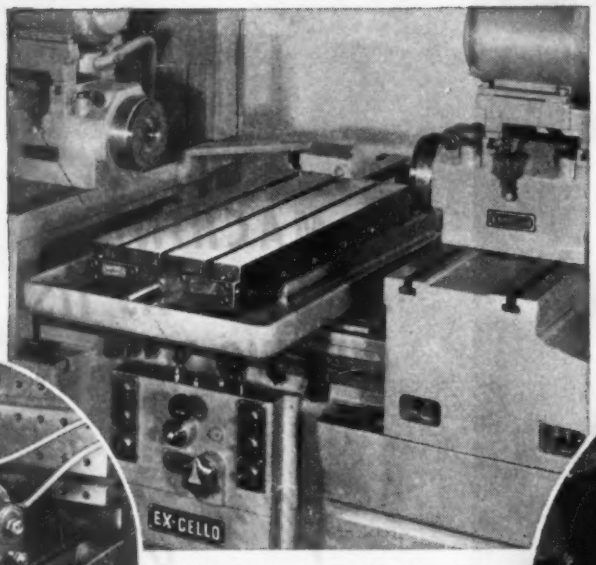
CONTINENTAL TOOL WORKS

DIVISION OF EX-CELL-O CORPORATION

DETROIT 6, MICHIGAN

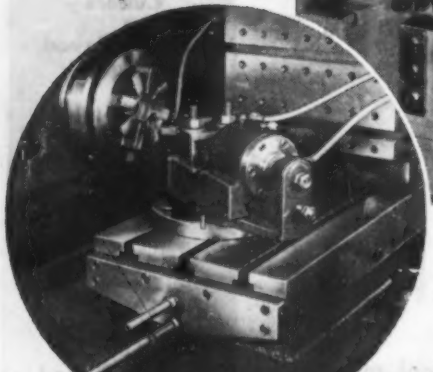
●

Flexibility IS THE



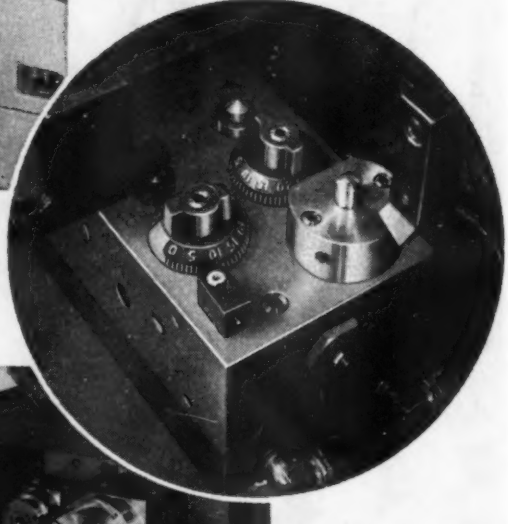
For finishing operations on job lots in all shapes and sizes, the Ex-Cell-O Precision Boring machine, shown at left, has proven ideal in a great many shops.

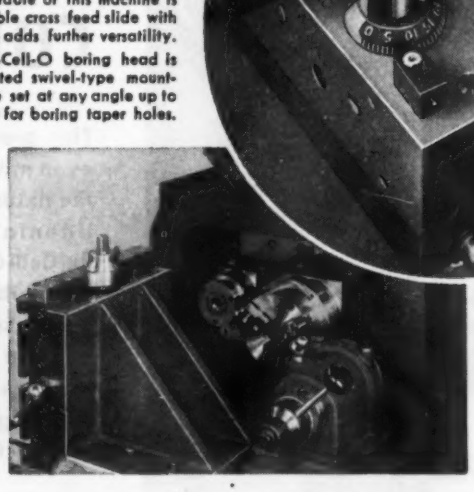
Below: An Ex-Cell-O standard adjustable cross feed slide is arranged with positive stop screws and an independent hydraulic panel.



Left: Mounted on the table of this machine is an Ex-Cell-O adjustable cross feed slide with chip pan. This feature adds further versatility.

Below: Note that Ex-Cell-O boring head is mounted on a calibrated swivel-type mounting so that it may be set at any angle up to 16 degrees right or left for boring taper holes.





Shown at left are additional available items such as a three-jaw chuck for turning or boring, and a micrometer adjustable boring bar block.

EX-CELL-O CORPORATION

XLO

EX-CELL-O *for* PRECISION

KEYNOTE

EX-CELL-O Boring Machines have Many Advantages for General Purpose Work in Tool Rooms and Experimental Departments

The tremendous increase in *precision* boring throughout American industry has brought a demand for a simple, flexible machine to be used for general purpose work of this kind in experimental departments and toolrooms. Ex-Cell-O standard single-end and double-end precision boring machines, equipped with various attachments and tooling as illustrated here, are proving ideal in a great many shops for turning, facing and boring operations on job lots in different shapes and sizes . . . The boring heads are suitable either for quill mountings, or chuck mountings for a wide variety of work-piece sizes. An adjustable cross-feed slide with chip pan can be mounted on the machine table. A complete box travel motion may be obtained by using a combination of settings between the main machine table and the cross-slide. An additional feature is the optional use of a manually operated vertical slide with graduated dial . . . An Ex-Cell-O standard *precision* boring machine with a set-up like this may be the answer to your problem in experimental or toolroom work. Send today to Ex-Cell-O for Bulletin No. 27121.

DETROIT 6, MICHIGAN

Standard and Special Multiple Way-Type Precision Boring Machines

•

Multiple Drilling and Other Special Purpose Machines

•

Precision Thread Grinding Machines

•

Precision Lapping Machines

•

Broaches and Broach Sharpening Machines

•

Continental Cutting Tools

•

Tool Grinders

•

Hydraulic Power Units

•

Grinding Spindles

•

Drill Jig Bushings

•

Fuel Injection Equipment

•

R. R. Pins and Bushings

•

Pure-Pak Paper Milk Bottle Machines

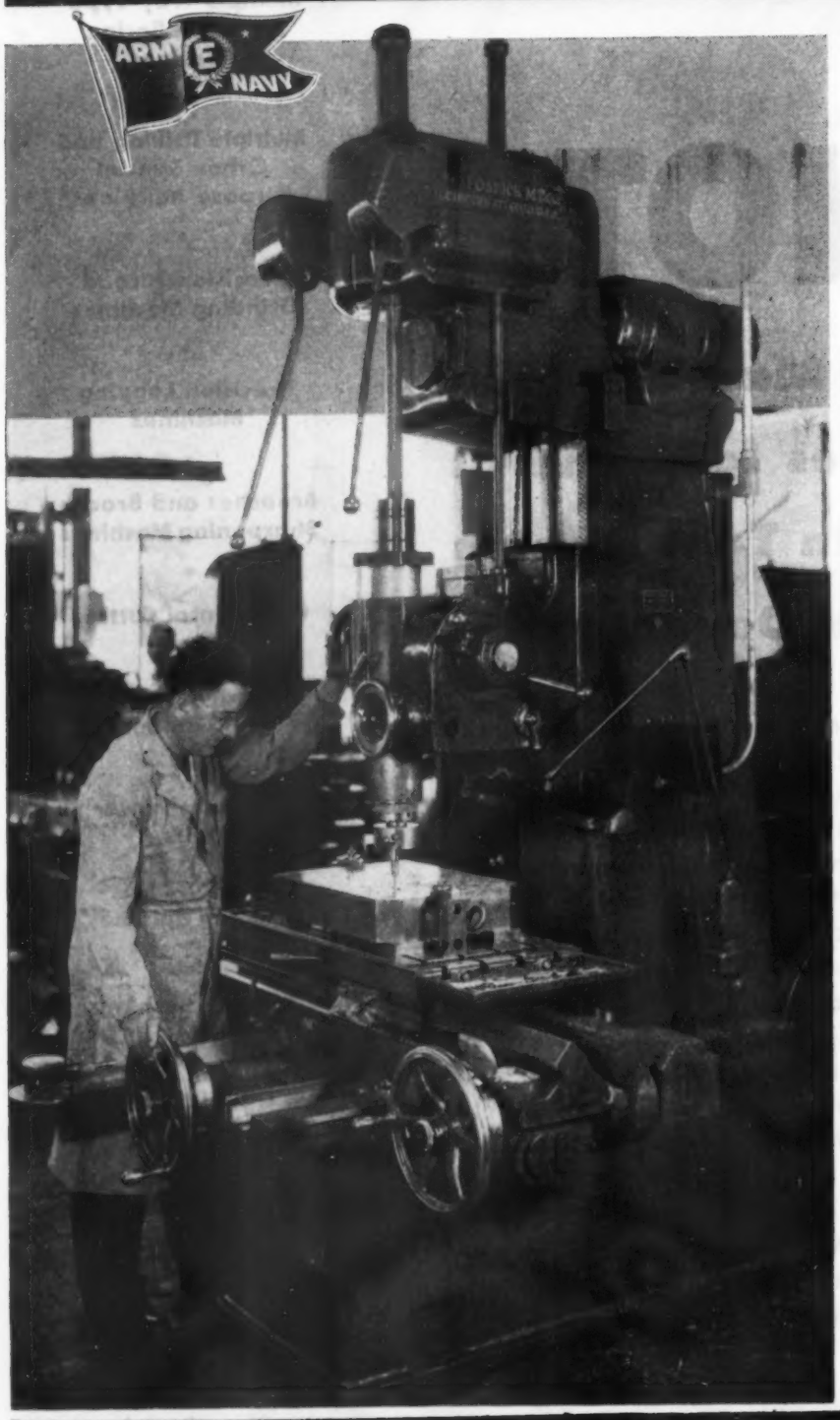
•

Aircraft and Miscellaneous Production Parts

45-57

FOSDICK JIG BORER

for close tolerance die and tool work



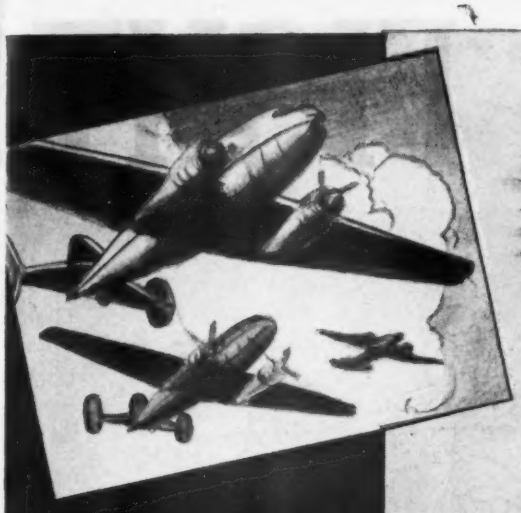
● The Fosdick Jig Borer is specifically designed to handle close tolerance boring operations. For this reason it is used extensively in tool rooms and tool and die shops. However, its versatility in handling production jobs in quantities too small to warrant an investment in jigs or fixtures has made it very popular with many shops producing war material.

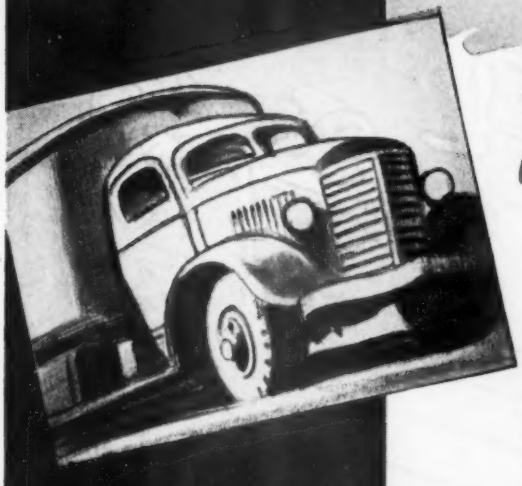
Here it is shown on a precision boring operation in a tool and die shop. Operation is simple. All controls are centralized for operating convenience. Twelve speeds in geometrical progression from 60 to 1500 RPM are instantly obtained thru a single lever. Nine feeds from .00125 inch to .010 inch are available thru a single control lever with direct reading index.

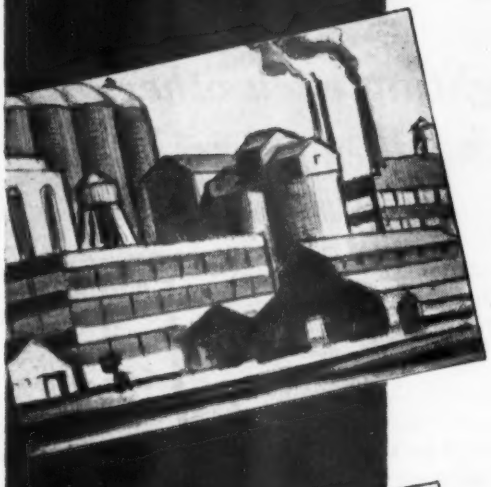
The Fosdick Jig Borer offers all the advantages of high priced precision machines at a comparatively low cost. It is ideal for precision drilling—boring—facing or even light milling operations. For speed—accuracy—low cost—put your precision jobs on a Fosdick Jig Borer.

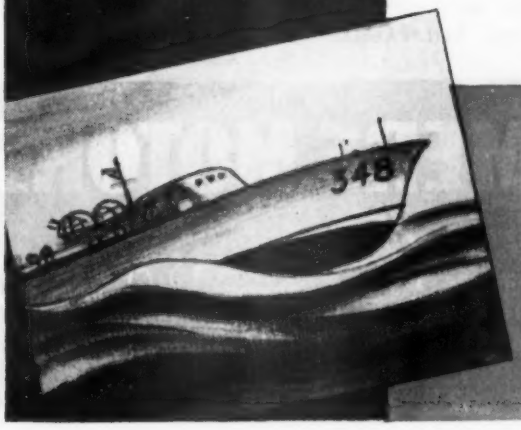
A full description bulletin is available—ask for Fosdick Jig Borer Bulletin J.B.A.

FOSDICK MACHINE TOOL COMPANY
CINCINNATI 23, ··· OHIO









PRECISION!

THE OUTSTANDING CHARACTERISTIC OF

FEDERAL

BALL BEARINGS

•

FEDERAL precision ball bearings are adaptable to every purpose — aircraft, automotive, industrial, marine. At home, or on distant battlefronts Federals sustain their reputation for *precision* performance.

Plan now to include these fine ball bearings in your new machines, tools, or products. Federals meet the most exacting requirements of designers, engineers and manufacturers in every important industry.

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THE FEDERAL BEARINGS CO., INC.

Makers of Fine Ball Bearings

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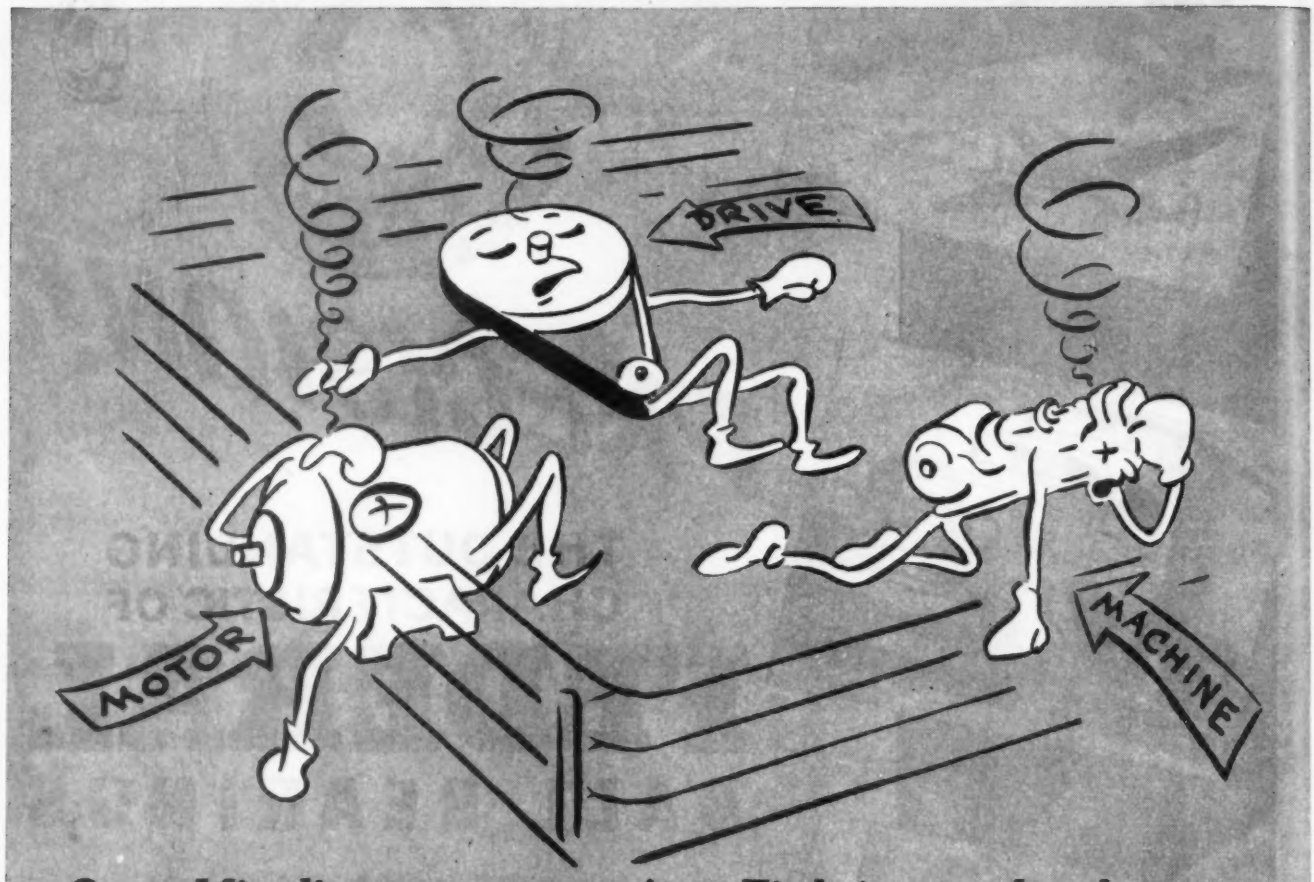
STOP THIS FIGHT!



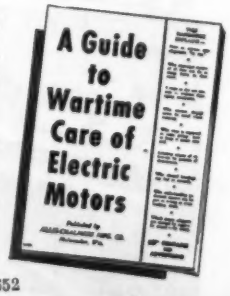
Once Misalignment starts 'em Fighting each other . . . the only Question is: Which will go First?

SPRUNG OR BROKEN shafts, burned-out bearings, overload failure—are cases of motor damage commonly caused by Misalignment. And the damage can occur in drive or driven machine, too. For when these elements are assembled in incorrect geometry, bending, breaking or excessive wear must result. *Something has to "give!"*

Picture above is from Allis-Chalmers' new "Guide to Wartime Care of Electric Motors" . . . which takes a fresh look at Misalignment *and the 8 other main enemies of motor life!*

Over 100,000 copies of this valuable new book are already in use by armed forces and industry. Applies to all makes—contains no advertising. Send for *your* free copy.

ALLIS-CHALMERS, MILWAUKEE 1, WIS.



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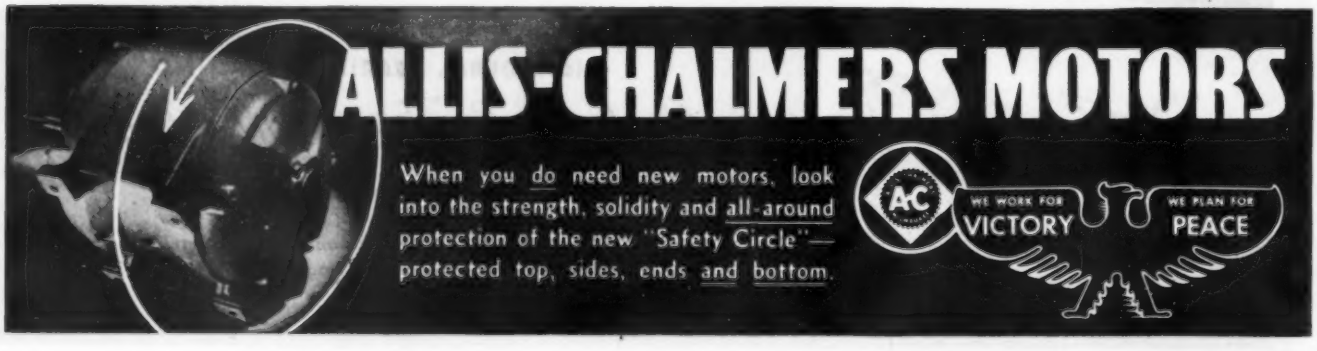
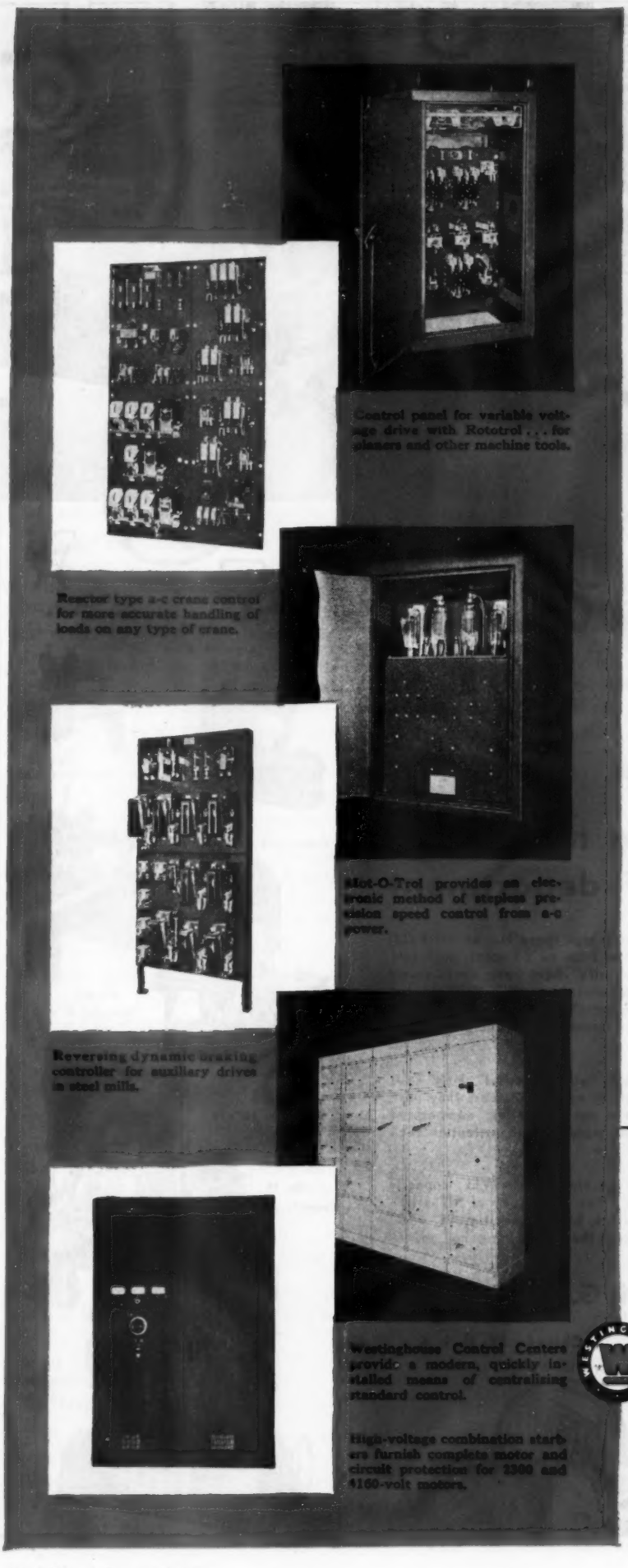

ALLIS-CHALMERS MOTORS
When you do need new motors, look into the strength, solidity and all-around protection of the new "Safety Circle"—protected top, sides, ends and bottom.
AC
WE WORK FOR VICTORY
WE PLAN FOR PEACE



Control panel for variable voltage drive with Rototrol . . . for planers and other machine tools.

Reactor type a-c crane control for more accurate handling of loads on any type of crane.

Mot-O-Trol provides an electronic method of stepless precision speed control from a-c power.

Reversing dynamic braking controller for auxiliary drives in steel mills.

Westinghouse Control Centers provide a modern, quickly installed means of centralizing standard control.

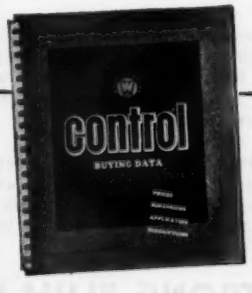
High-voltage combination starters furnish complete motor and circuit protection for 2300 and 4160-volt motors.

For any Motor Control

. . . call Westinghouse

Control properly selected and applied makes it easy to put motors through their paces . . . to stand up and deliver. Application of control can be greatly simplified also by making one supplier responsible for the entire motor drive.

Westinghouse motor control not only covers the entire range of standard a-c and d-c controls and accessories for every type of drive, but many specialized types of control like those shown at left. Regardless of the job, you are assured of a completely co-ordinated installation. Call your Westinghouse office, or write Westinghouse Electric & Manufacturing Company, P. O. Box 868, Pittsburgh 30, Pa. J-60587

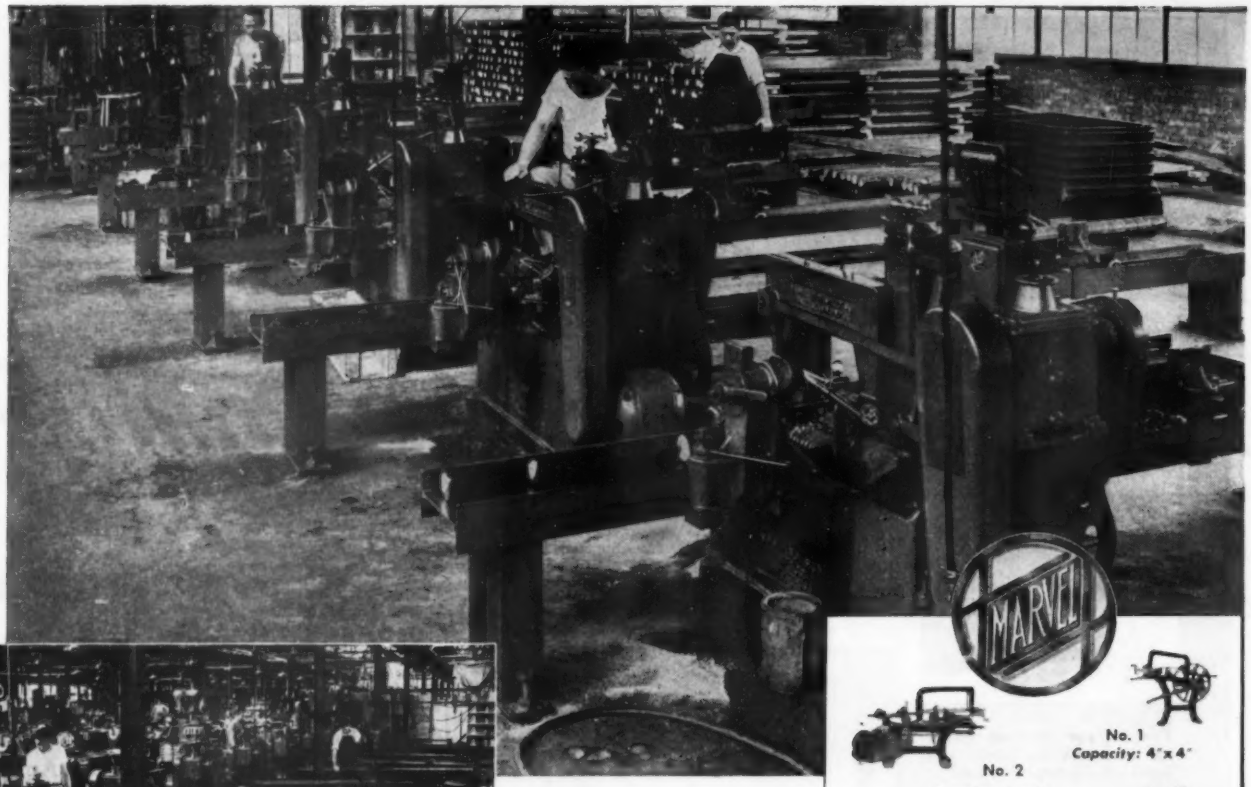


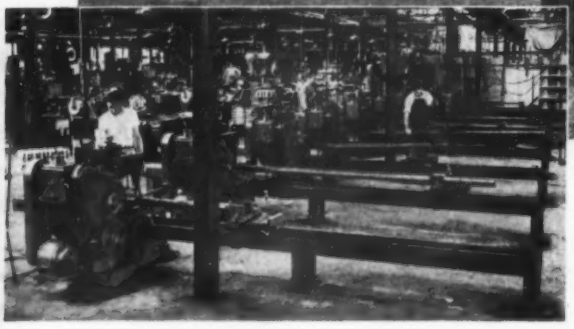
Selection of Westinghouse standard motor control is greatly simplified by this 290 page Buying Data book. If you do not have a copy, phone or write your Westinghouse office for Catalog 7000.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Motor Control





WAYNE PUMP has a modern "automatic" cutting-off department

Here is an efficient cutting-off department—a battery of nine high-speed No. 6A MARVEL Automatic Bar Feed Hack Saw Machines, which are supplied from an adjacent stock pile by an overhead monorail system. These MARVEL "Automatics" have been continuously cutting-off accurate lengths from 3⅛" and 3-3/16" diameter bars (WD 4150 M hot rolled steel) since 1942. With only 3 operators this "automatic" cut-off department has been able to keep ahead of not only the Wayne's large ordnance contracts but their various subcontract jobs as well.

Under this continuous "pounding", at wartime speed, these "world's fastest" hack saws have proven "practically trouble free." Day in and day out for over three years they have continued to automatically feed, measure, and accurately cut-off endless numbers of pieces from single or nested bars, tubes and shapes with no more operator attention than is required by automatic screw machines.

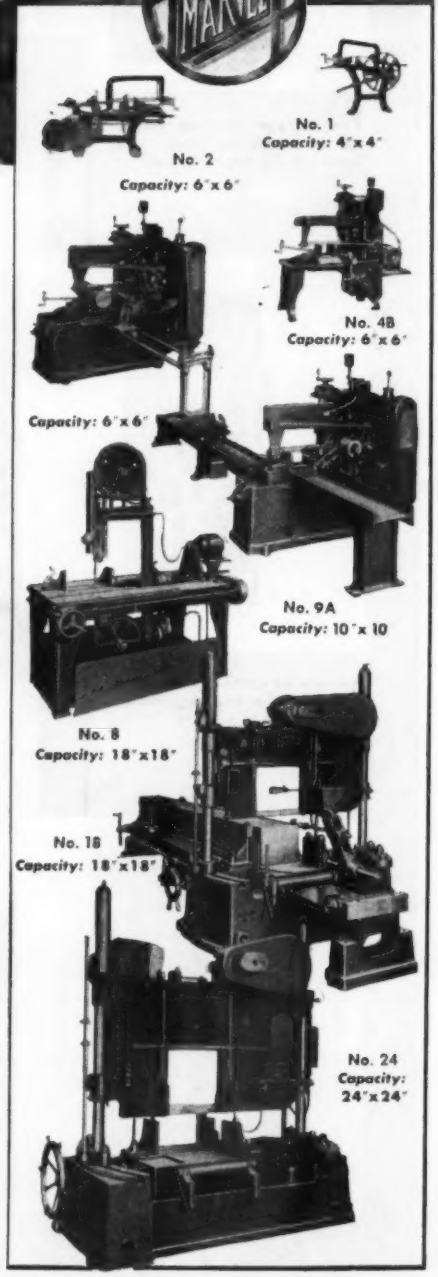
MARVEL Automatic Production Saws come in two sizes, the No. 6A MARVEL, capacity 6" x 6" (pictured above), and the No. 9A MARVEL which has a capacity of 10" x 10". For larger size work the new MARVEL "Giant Hydraulic Hack Saws (capacities 18" x 18" and 24" x 24") are the first choice because they easily handle the largest sizes and toughest steels.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave. **Chicago 39, U. S. A.**

Eastern Sales Office: 225 Lafayette St., New York 12, N. Y.



It is reported that . . . . . .

Ball bearings, for precision equipment, are now made with outside diameter as small as two millimeters. *Science News Letter.*

get ready with CONE for tomorrow

The first cotton crop to be harvested entirely by machine has recently been reported. The result seems to be a lower grade of cotton offset by reduced cost. *Time.*

get ready with CONE for tomorrow

Postwar automobile wheel rims are to be wider, or about three-fourths of the tire width. *National Wheel Rim Assn.*

get ready with CONE for tomorrow

The combined use of the electron microscope and the three-dimensional vectograph is making possible better observation of the structure of metals and consequent improvement of alloys. *Dow Chemical Company.*

get ready with CONE for tomorrow

A new product is intended to seal the spaces between spot welds and make a continuous liquid-tight joint. *Presstite Engineering Co., St. Louis.*

get ready with CONE for tomorrow

A new system of aircraft engine lubrication is claimed to supply an adequate flow of oil as high as 45,000 feet. *Penn. State College and Sharples Co., Phila.*

get ready with CONE for tomorrow

The number of persons employed in individual research laboratories just about doubled in the ten years ending in 1940. *G. Edward Pendray, Asst. to President, Westinghouse Electric & Mfg. Co.*

get ready with CONE for tomorrow

A new process of adding carbon black to liquid rubber latex will, it is hoped, reduce the cost of tires and add to their service. *General Tire & Rubber Company.*

get ready with CONE for tomorrow

It is claimed that one of the new rechargeable flashlight batteries will outlast 400 of the usual dry cell type. *B. F. Goodrich Co.*

A new 4 by 6 foot "tectonic" map of the United States shows the complete geologic structure of the country and is said to be the first of its kind ever published. *American Assn. of Petroleum Geologists.*

get ready with CONE for tomorrow

A new device called the "Odograph" automatically makes a map, in any scale, of a road while being carried in a fast-moving automobile. *U. S. Army Engineer Corps.*

get ready with CONE for tomorrow

A jet propulsion drive for torpedoes has recently been patented. *Science News Letter.*

get ready with CONE for tomorrow

A portable electrostatic air cleaner is used to precipitate the smoke produced by welding. *Westinghouse Electric & Mfg. Co.*

A manual of instruction in the making of aerial "highway signs" for the guidance of aircraft has just been published. *Civil Aeronautics Administration.*

get ready with CONE for tomorrow

The Combined British Astronautical Societies have designed a "space ship" in which they propose to send three men to the moon in about 48 hours. *Electronic Markets.*

get ready with CONE for tomorrow

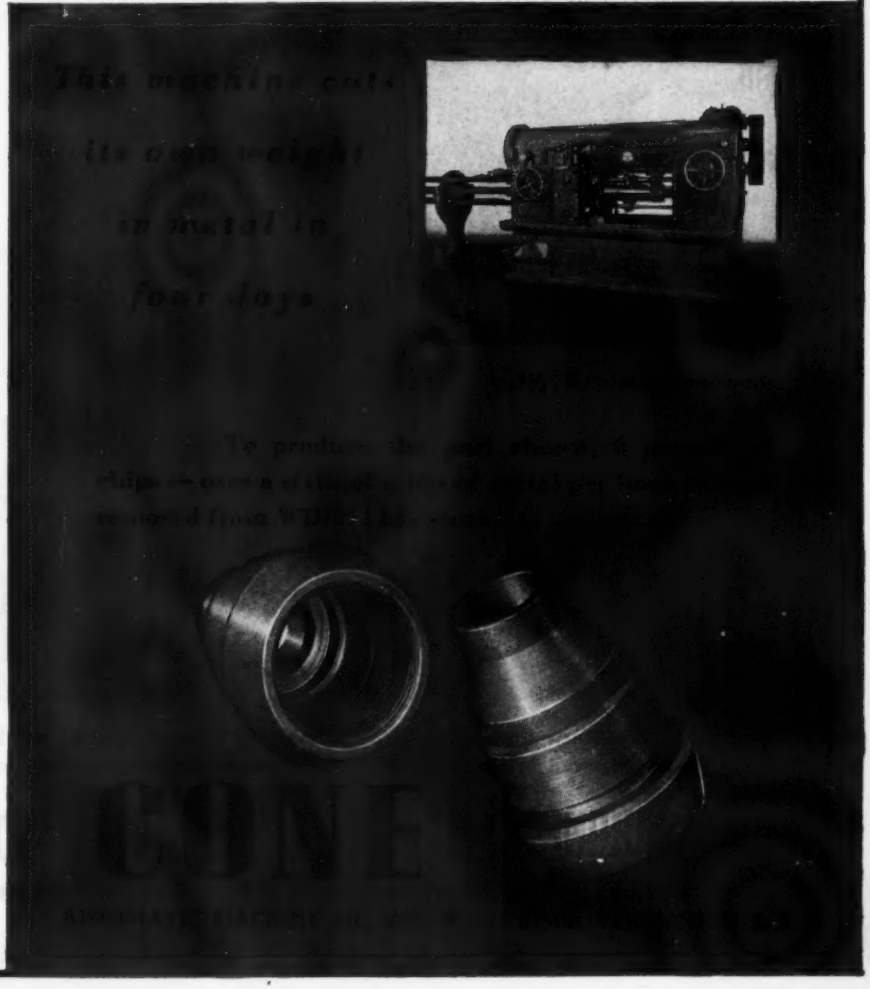
An automobile manufacturer is already planning the assembly-line production of helicopters. *Nash-Kelvinator Corp.*

get ready with CONE for tomorrow

A new material for shoe soles is said by the maker to be lighter and more durable than leather and resistant to oil and water. *B. F. Goodrich Co.*

get ready with CONE for tomorrow

More than 80,000 farmers obtained government priorities to electrify their farms, in 1943, as a means of increasing food production. The 1944 total will probably reach 120,000. *EMPIC No. 8.*



The JIGMIL has proven to be a totally new approach to the problems of economical precision BORING and milling of tool and production work

THE fastest producing and most accurate machine in the field.

Many users are reporting consistent experience of two to three times the output and higher quality work.

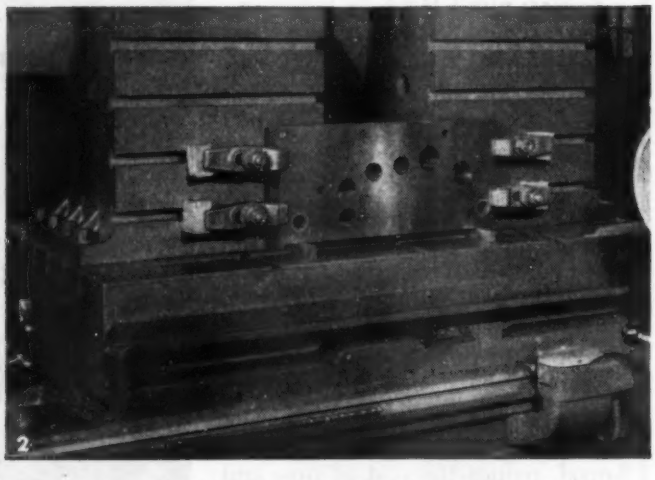
Automatic positioning of spindle from one location to another in response to measuring rods and push buttons to within less than .0001 (one ten-thousandth part of an inch).

Feather touch, pressure controlled slide locks that positively control locking uniformity, so essential to high precision work.

Unique operation and controls that make possible high precision work with relatively little skill.

★ ★ ★

JIGMIL—The world's finest BORING and milling machine is made in Detroit.

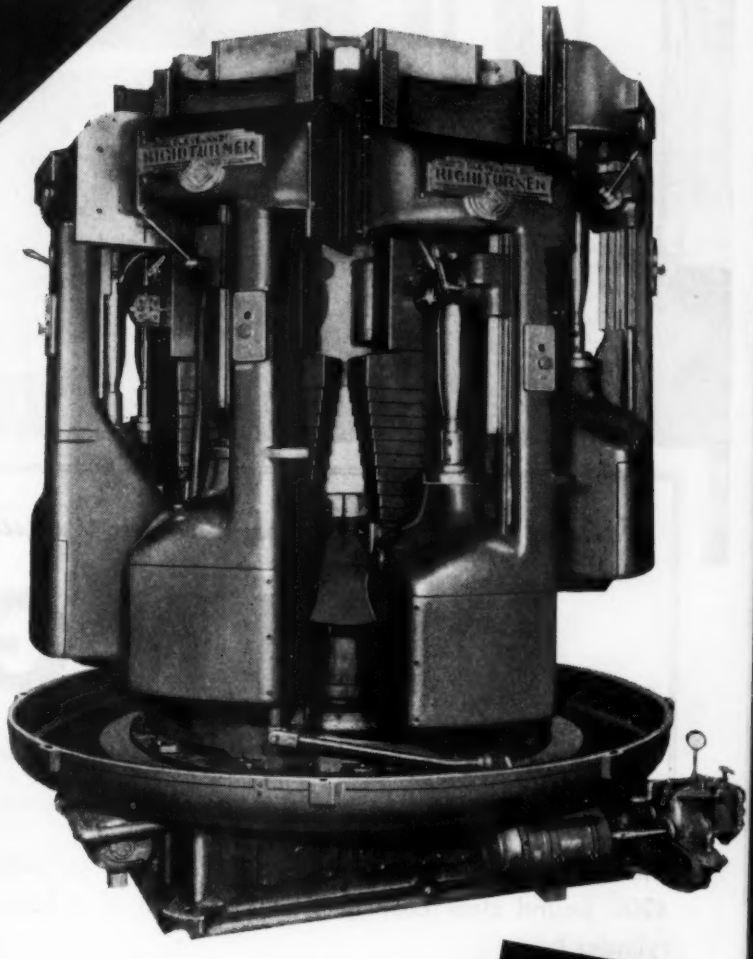


★ **No. 1—Illustration showing convenience of jig plate boring. No. 2—Eight holes precision bored. Holes spaced within .0001 with total dependence of all spacing on automatic positioning means.**

DeVLIEG MACHINE COMPANY DEVLIEG JIGMIL **450 FAIR AVE. FERNDALE 20, (Detroit) MICH.**

WHEN YOU NEED THOUSANDS
OF MULTIPLE DIAMETER JOBS
LIKE THIS ➡ ➡ ➡

The Rotary RIGIDTURNER



● For the mass production of multiple diameter jobs the Rotary Rigidturner meets your needs from the standpoint of production—precision—uniformity and low costs.

Maintaining essentially the same operating functions as the single spindle Rigidturner this high production machine combines eight spindles in one unit.

This construction offers several advantages . . .

Greater production — eight pieces turned simultaneously.

Automatic operation — operator merely loads and unloads work.

Faithful duplication — each formed cutter operates at the same speed and feed.

Simple to operate — does not require specially skilled labor.

Saves floor space — compact design and vertical construction requires minimum floor space.

The Rigidturner single spindle model also available is particularly adaptable to short runs and quick changeover.

Consult Cleveland Hobbing Engineers on your multiple diameter work.

THIS BOOKLET

tells about Rigidturners—what they do—how they do it—and how they can save time and costs on multiple diameter turning. Write for one today.

The CLEVELAND HOBBING MACHINE Company

General Offices:
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CLEVELAND 17, OHIO

Chicago Office:
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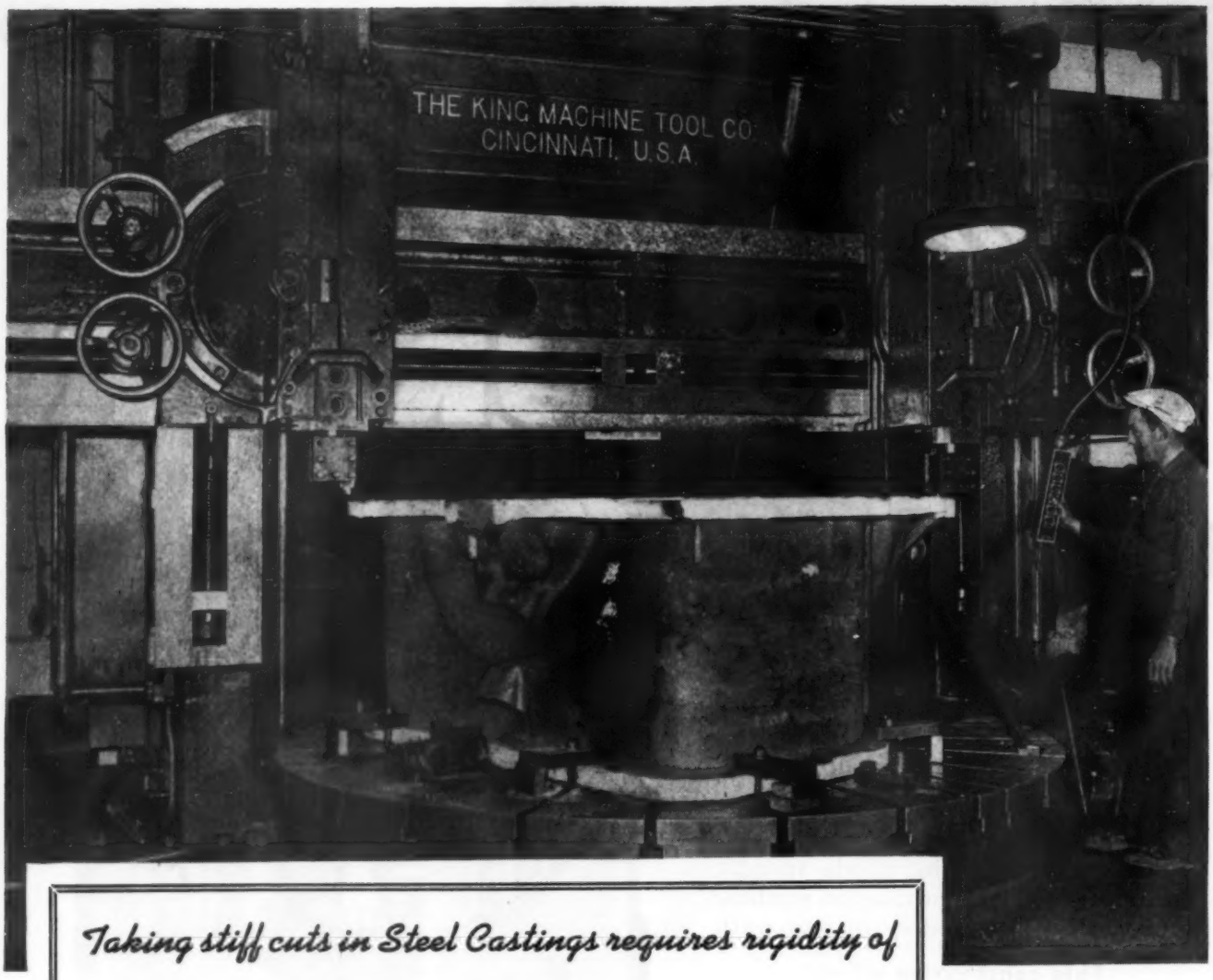
CHICAGO 5, ILLINOIS

BUILDERS OF RIGIDHOBBERS AND RIGIDTURNERS



Taking stiff cuts in Steel Castings requires rigidity of

KING

VERTICAL BORING AND TURNING MACHINE

This King Vertical Boring Machine is taking a ¼ inch roughing cut on the 4200 pound steel casting. The operation is a facing cut on a Turbine cylinder base.

This is only one of several King Vertical Boring Machines at this plant and the job shown is typical of the work being handled.

When you want capacity for big jobs—power to take heavy cuts—rigidity that insures close tolerances—put the job on a King. These machines are designed and built to handle carbide tools assuring maximum production.

KING BUILDS

Vertical Boring and Turning Machines exclusively—single column types from 30" to 42" and double column 52" to 12 feet.

THE KING MACHINE TOOL COMPANY
CINCINNATI 32, OHIO

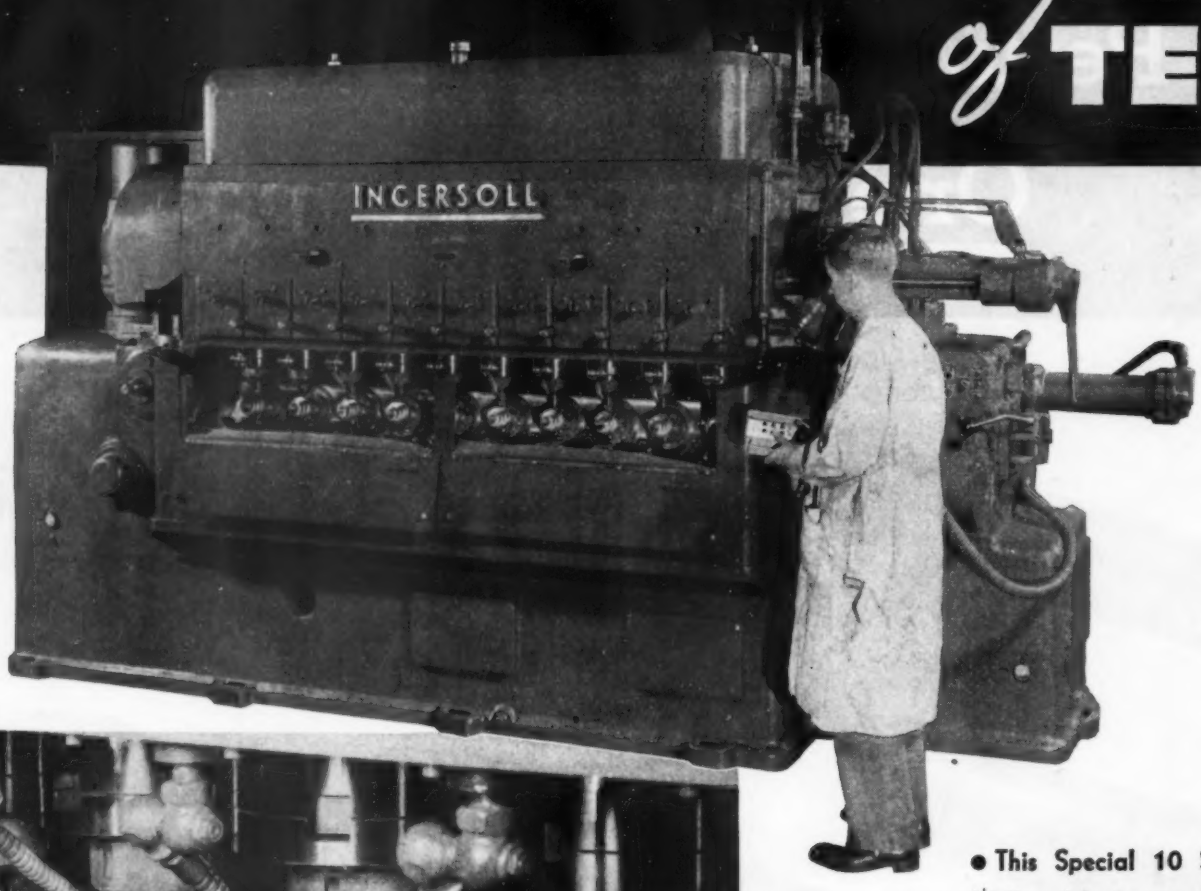
BUILDERS OF VERTICAL BORING AND TURNING MACHINES EXCLUSIVELY

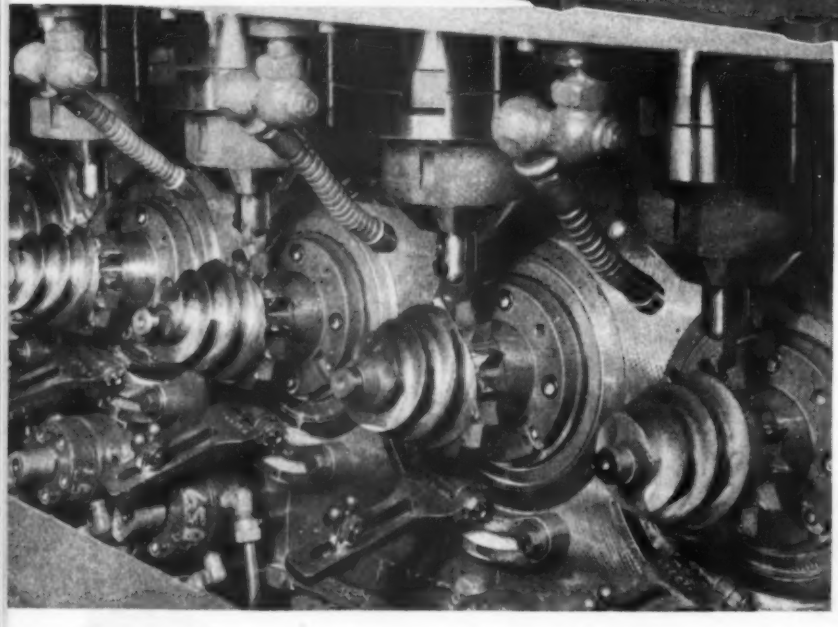
Performance—Economy . .

One source of supply

Collets and Feed Fingers for all makes of
Automatics, Chucking Machines and Turret Lathes

One machine does the work of TEN

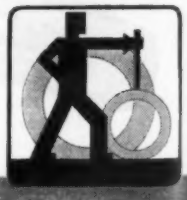




• This Special 10 Spindle Milling Machine is helping a manufacturer of oil well drilling equipment produce more of his product . . . vitally needed to increase the country's oil supply.

• It machines the teeth in well bits, working on 10 pieces simultaneously, and produces more sets than the combined production of the ten standard single spindle machines previously used.

• This milling machine is a specialized answer to a particular problem. Although your production problems may be entirely different, a study of them will determine whether similar results can be obtained with special machinery. May we help?



THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILL.

INGERSOLL

SPECIALIZED MILLING, DRILLING, BORING, TAPPING, SCALPING MACHINES

BETTS-BRIDGEFORD LATHES

BETTS-BRIDGEFORD LATHES

For Speed, Accuracy and Economy

BETTS-BRIDGEFORD
96" COMBINATION
BORING AND TURNING LATHE

This Betts-Bridgeford Lathe will swing work 100 inches in diameter over the bed. It takes 70 feet between centers, and will bore up to 25 feet in length. ACCURATE . . . POWERFUL . . . FAST.

Betts-Bridgeford Lathes are built from 26" up to any requirement

CONSOLIDATED HEAVY DUTY MACHINE TOOLS INCLUDE....
LATHES
BORING MILLS
DRILL PRESSES
MILLING MACHINES
BORING MACHINES
PLANERS
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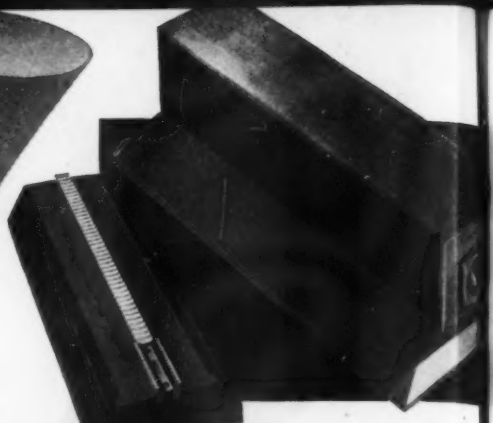
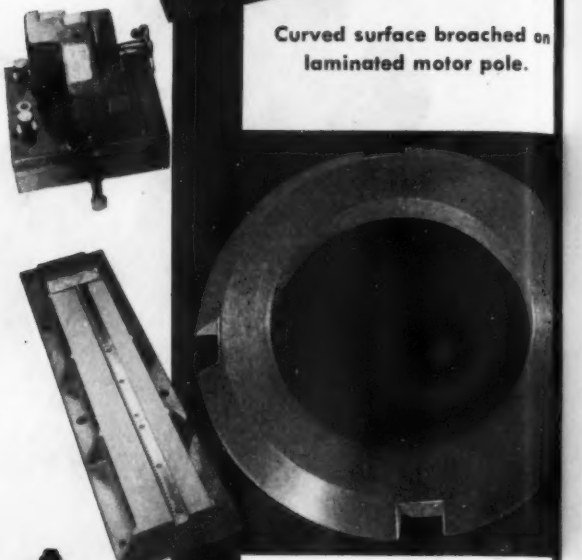
CONSOLIDATED MACHINE TOOL CORPORATION • ROCHESTER 10, NEW YORK

Economical FOR SHORT RUNS!

Entire contour including teeth surface broached with two strokes of machine.



Curved surface broached on laminated motor pole.



Four notches surface broached using hand indexing fixture. Six pieces are finished on four strokes of machine.

"Tee" notch broached in tube end.

While Footburt Surface Broaching has been developed for highest production on single purpose machines there are many plants in which several parts may be handled on one machine at remarkable savings over previous machining methods.

On this particular machine four sets of fixtures and broaches are used to machine four widely varied parts. The fixtures and broaches are simple and may be quickly interchanged. No changes or adjustments on the machine itself are required when changing from one job to another.

Please send blueprints and production requirements and we will be glad to make recommendations for the proper Footburt equipment.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio
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Footburt Patented Tooth For

FOOTBURT *Surface Broaching*

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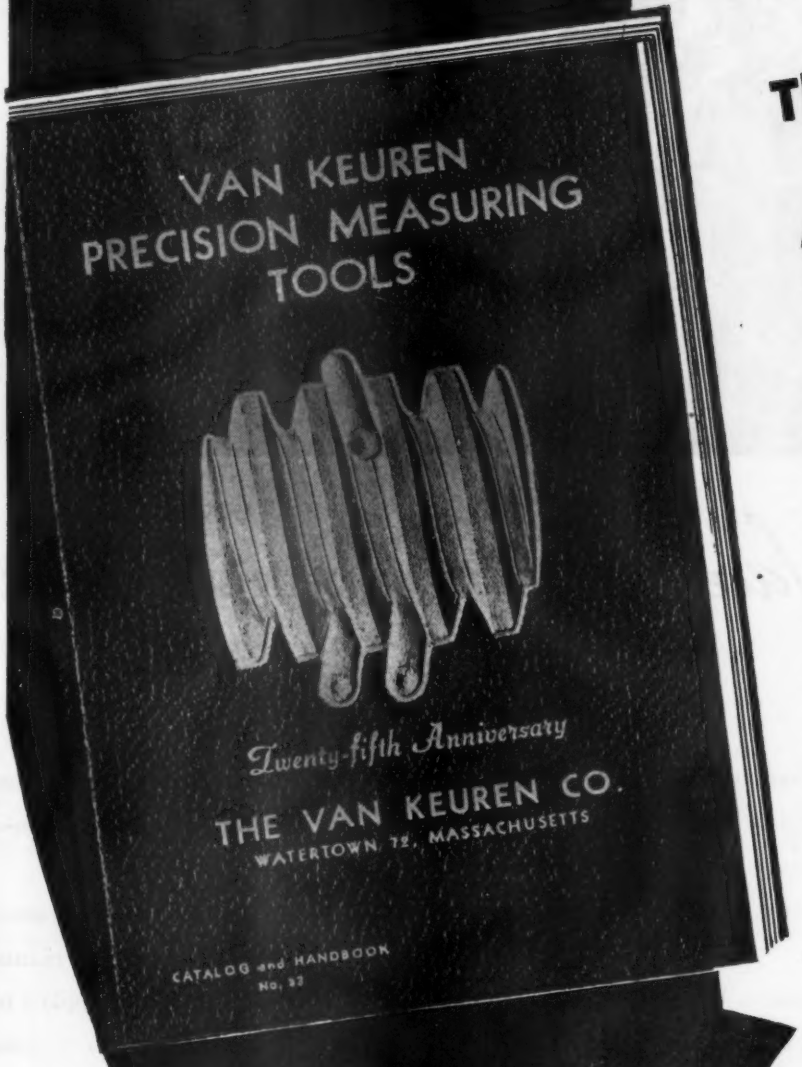

The NEW *Van Keuren* CATALOG and HANDBOOK No. 33

This new, revised Technical Catalog and Handbook contains 160 pages of practical, useful information in ready reference form on precision measuring. It describes, by text and illustration, various accepted methods and equipment for checking accuracy to hundred thousandths and millionths of an inch.

Through the use of the Van Keuren equipment described in this handbook, many outstanding improvements in production and product quality have been attained, and closer tolerances more easily achieved.

PARTIAL LIST OF CONTENTS

NEW PRODUCTS:

New Light Wave Equipment with fused quartz optical flats.
New Laboratory Type Monochromatic Light.
New Solid Square Master Blocks having permanent accuracy.
New and complete Gear Measuring Tables from 5 to 500 teeth.

ENGINEERING DATA

How to measure standard and special screw threads.
Screw Thread data including tables of basic diameters and tap drill sizes for all American threads.
Thread proportions for American and Foreign threads.
Bureau of Standards measuring wire specifications.
How to measure spur and helical gears.
How to measure angles.
How to use optical flats.
Notes on gaging holes.

THE *Van Keuren* COMPANY

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Kindly send me a copy of your 1945 New and Revised Catalog and Handbook No. 33. It is understood that this request incurs no obligation.

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Where the surface reflects UNBROKEN SPEED RANGE

It's the surface speed that counts when you're machining metals. That's why a wide stepless speed range is important—a few rpm's could make a big difference in the surface finish. And that's why adjustable voltage control is your best bet.

Here's just one example—a centerless grinder. With a twist of the wrist the operator can select any motor speed between 60 and 1600 rpm—*no* blind spots in the range. No gears, belts or levers to shift, either. A special d-c motor with adjustable voltage control provides direct drive in a stepless range of speeds. It permits selection of the exact rpm to hit surface speed requirements on the nose, regardless of the size and type of workpiece. The results show up in finer finishes—less rejects—more production.

This adjustable voltage drive was developed to meet the specific needs of an individual machine tool manufacturer. But standard or special types can be applied to fit *your* drive problems, too. It's one of many examples of how Westinghouse puts the *machine* in machine tools. For a simple electrical solution to your complex mechanical problem come to Westinghouse—electrical partner of the machine tool industry. Westinghouse Electric & Mfg. Co., P. O. Box 868, Pittsburgh 30, Pa.

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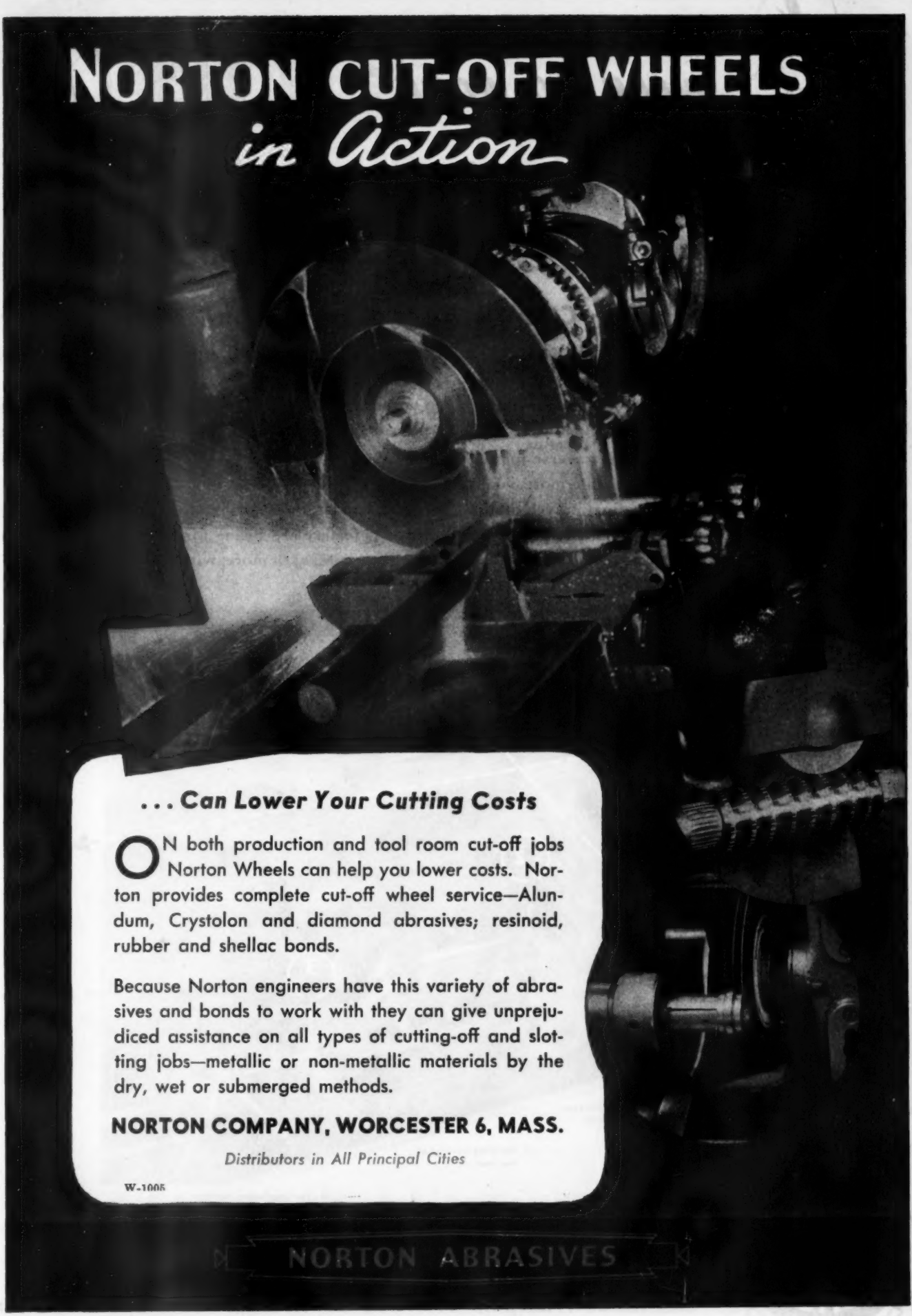
THE MACHINE IN MACHINE TOOLS

NORTON CUT-OFF WHEELS
in Action



. . . Can Lower Your Cutting Costs

ON both production and tool room cut-off jobs Norton Wheels can help you lower costs. Norton provides complete cut-off wheel service—Alundum, Crystolon and diamond abrasives; resinoid, rubber and shellac bonds.

Because Norton engineers have this variety of abrasives and bonds to work with they can give unprejudiced assistance on all types of cutting-off and slotting jobs—metallic or non-metallic materials by the dry, wet or submerged methods.

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NORTON ABRASIVES

DON'T MAKE TOOLS WALK TO WORK...

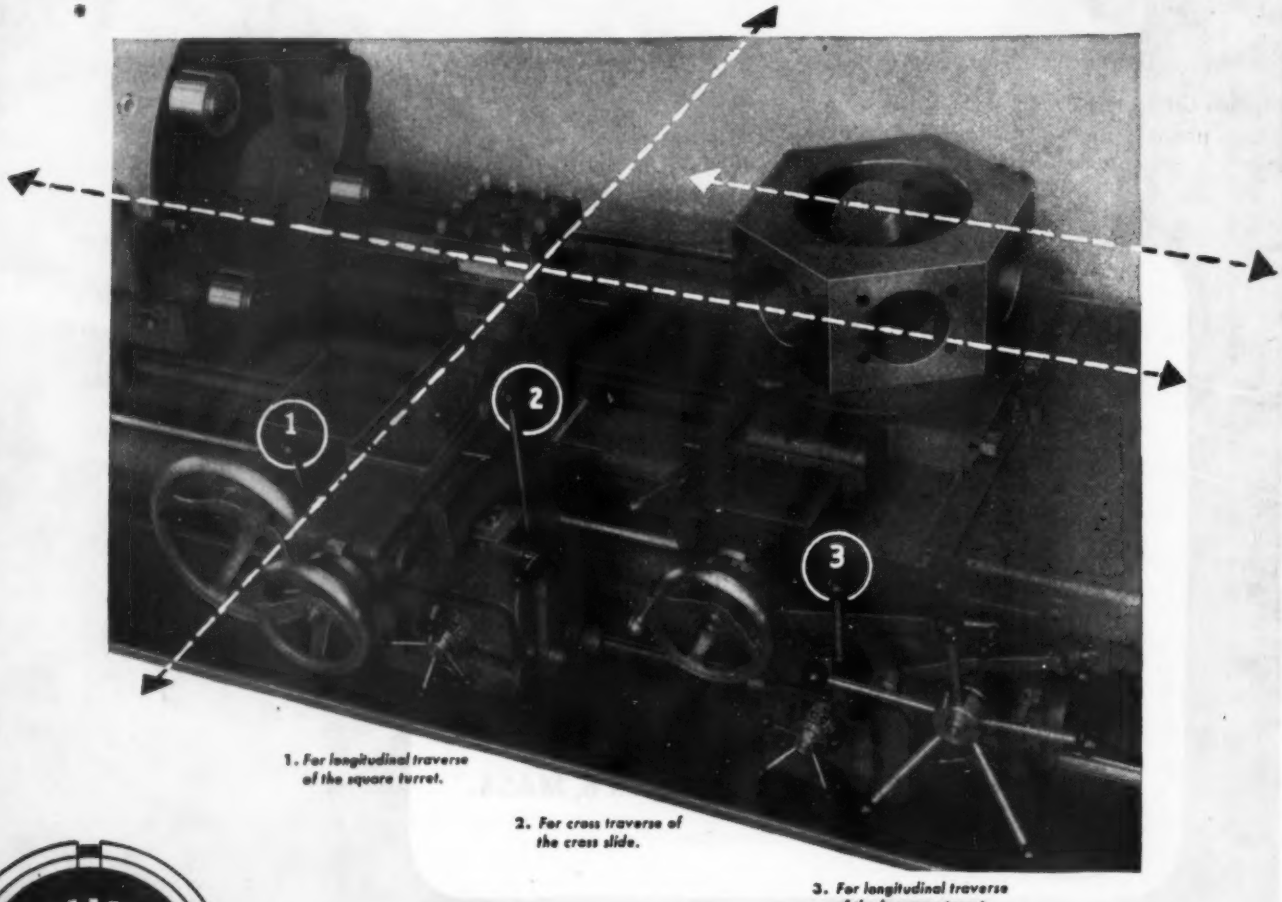
GIVE 'EM A RIDE!

GISHOLT Standard—COMPLETE *Power Rapid Traverse* for ALL Saddle Type Turret Lathes

Here's another good reason why work goes faster on *all* sizes of Gisholt Saddle Type Turret Lathes.

There's longitudinal power rapid traverse for the hexagon turret carriage, of course. Furthermore, you'll find it provided for the longitudinal travel of the square turret carriage, and—an advantage pioneered by Gisholt—for transverse travel of the cross slide. Quicker movement of tools in and out of cutting position reduces time between cuts. And it relieves the operator of laborious hand-turns—saves as much as one-third of his time on many jobs.

No wonder operators familiar with the *complete* traverse feature are strong for Gisholt. It helps them produce more, earn more, with less fatigue.



1. *For longitudinal traverse of the square turret.*

2. *For cross traverse of the cross slide.*

3. *For longitudinal traverse of the hexagon turret.*

GISHOLT

GISHOLT MACHINE COMPANY

1201 East Washington Avenue • Madison 3, Wisconsin

Look Ahead... Keep Ahead... With Gisholt Improvements in Metal Turning

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES

THE EASIEST-TO-USE DIE HEAD ... and the Fastest

Here is an improved NAMCO non-rotating DIE HEAD that "streamlines" the whole thread-cutting operation —brings new ease of operation and convenience— shortens idle time—gets more work done.

Open or Close from any position

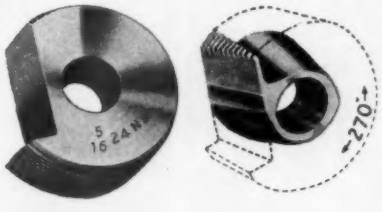
Close die by a quarter-turn from open position, in *either* direction. Handle is always in easy reach no matter where die head is positioned on machine.

Replace Chasers In *Seconds*

Merely lift the handle and chasers, mounted on blocks, slide out of grooves. From dull to sharp chasers is a matter of a few seconds—no screws to loosen or tighten—no change of precision.

The Circular Chaser Principle

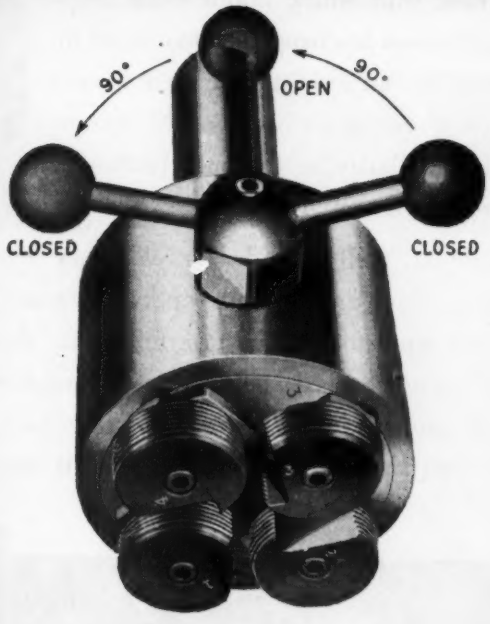
Namco Circular Chasers have proved their ability to produce more precision work. They eliminate trial cuts—the first piece is *production*—uniform precision insured throughout long runs.



Circular chasers may be ground through 270° circumference, increasing chaser life 10 to 50 times longer than other types.

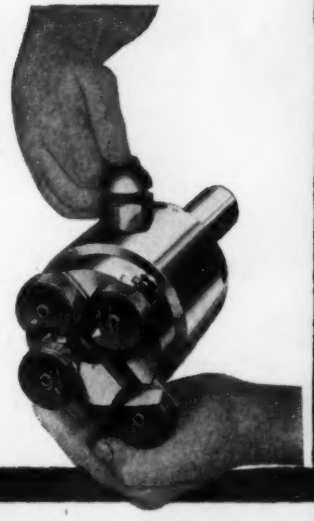
Here is your complete data

The new Namco Die and Tap Catalog, D-42-B, gives you all details of Namco tools for high-speed precision work. Send for your copy.



Open and close with 90° turn of handle, in *either* direction.

Lift handle to remove chasers . . . no screws to turn, no adjustment to make.



The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley 4-6 and 8 Spindle Bar and Chucking Automatics • Single Spindle Automatics • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

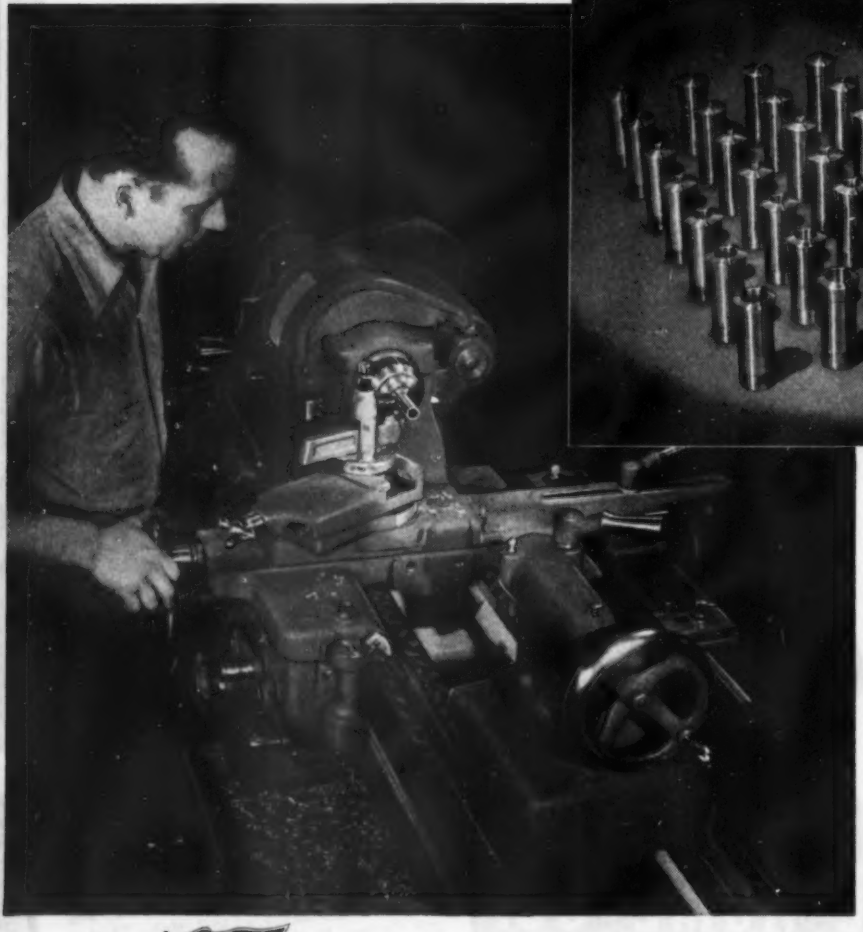
Versatility
for Precision Toolroom Work

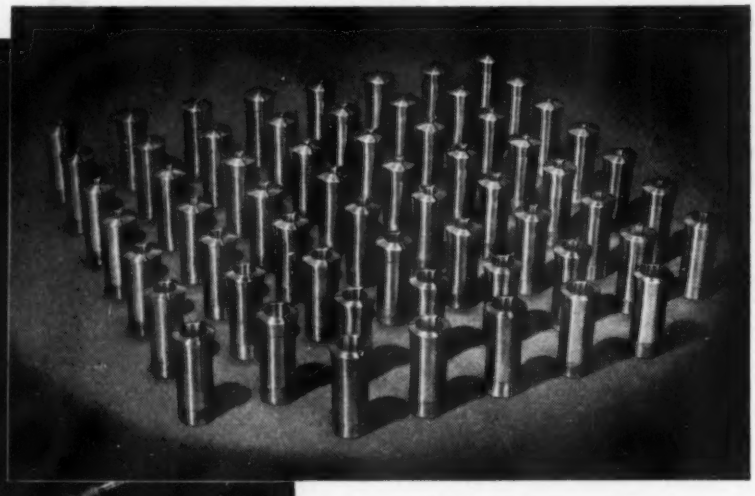
The ease with which South Bend Toolroom Lathes can be changed from one set-up to another for an almost unlimited variety of precision operations is one of the reasons for their popularity in the busy toolrooms of war-rushed essential industries.

Convenient, well placed controls; easy reading graduated dials; and smooth operation save time and reduce operator fatigue to a minimum. A wide range of spindle speeds permits machining various kinds of metals with maximum cutting tool efficiency. Threads and power feeds for all requirements are instantly available through a full quick change gear mechanism.

A complete line of attachments and accessories simplifies tooling the lathe for many special and unusual classes of toolroom work.

South Bend Toolroom Lathes and Engine Lathes are made in five sizes: 9″, 10″, 13″, 14½″, and 16″ swing respectively. Precision Turret Lathes are available in two sizes: Series 900 with 9″ swing and ½″ collet capacity and Series 1000 with 10″ swing and 1″ collet capacity. Write for catalog.





COLLETS

Collets for all sizes and types of South Bend Lathes are now being shipped directly from stock. All sizes from 1/16″ to 1″ diameter in steps of 1/64″ are available.

A complete set of collets is especially helpful in toolroom and maintenance work. Often the time saved by having on hand the right size collet for a single rush job will more than compensate for the cost of a full set of these fine collets.

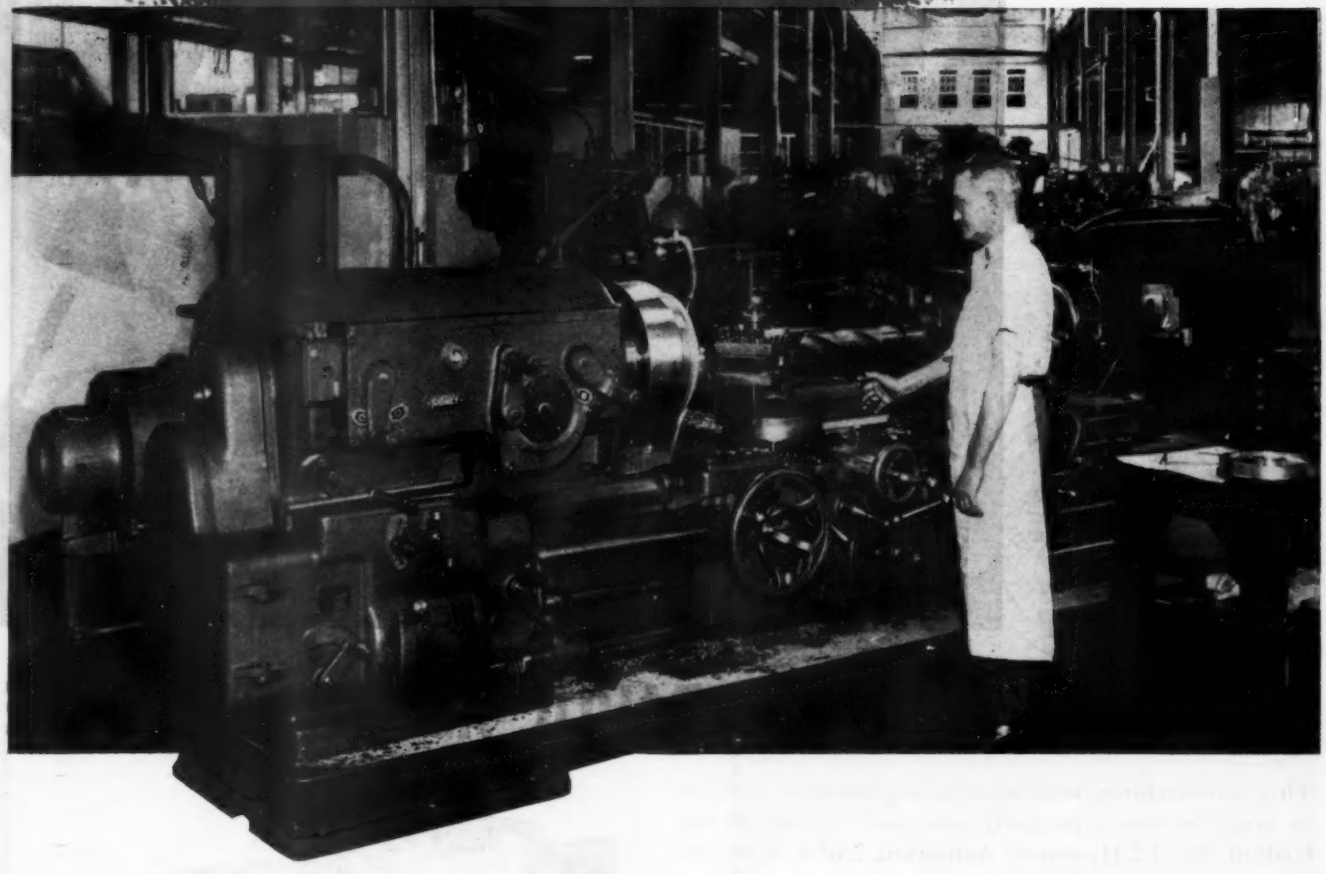
Check your collet requirements today—for toolroom, maintenance, and production work—and order all you need. Specify size and serial number of lathe.

Buy War Bonds—Save For Lathes

SOUTH BEND LATHE WORKS

419 E. MADISON STREET • *LATHE BUILDERS FOR 38 YEARS* • SOUTH BEND 22, IND.

SIDNEY LATHE
meets rigid requirements of
MARMON HERRINGTON



● Precision turning, facing and drilling operations are all in a day's work for this 24-inch Sidney Lathe at Marmon Herrington.

The heavy, rigid base with four-wall construction, amply cross-braced insures the rigidity required to meet precision demands. Also note on this large lathe all controls are easily reached by operator in normal working position.

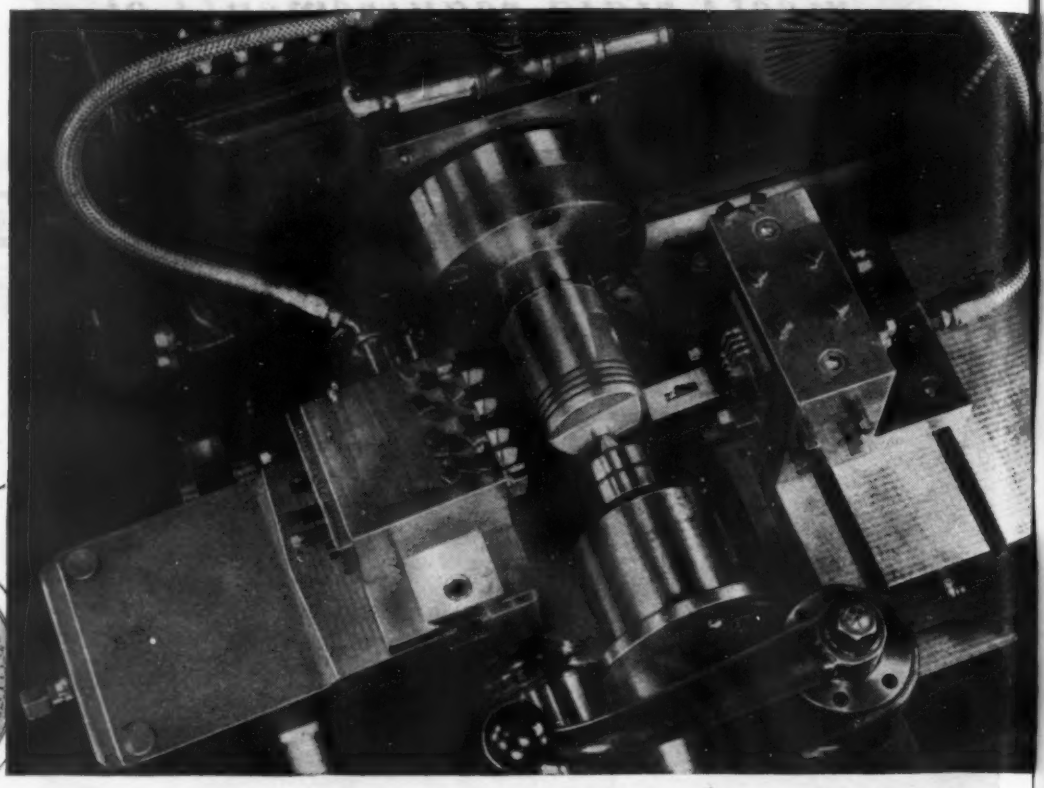
The continuous tooth herringbone geared head assures a smooth flow of power to the spindle and provides ample power for carbide high-speed tools.

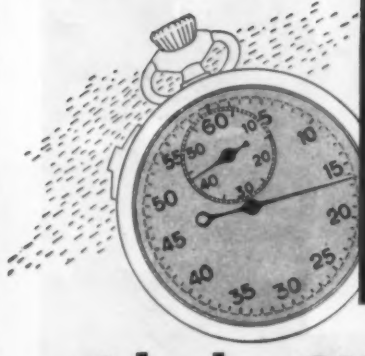
For your precision turning, boring and similar operations put your work on a Sidney Lathe.

Bulletins on all sizes available.

The SIDNEY MACHINE TOOL COMPANY
Builders of Precision Machinery
SIDNEY • OHIO
ESTABLISHED 1904

3 pistons per minute





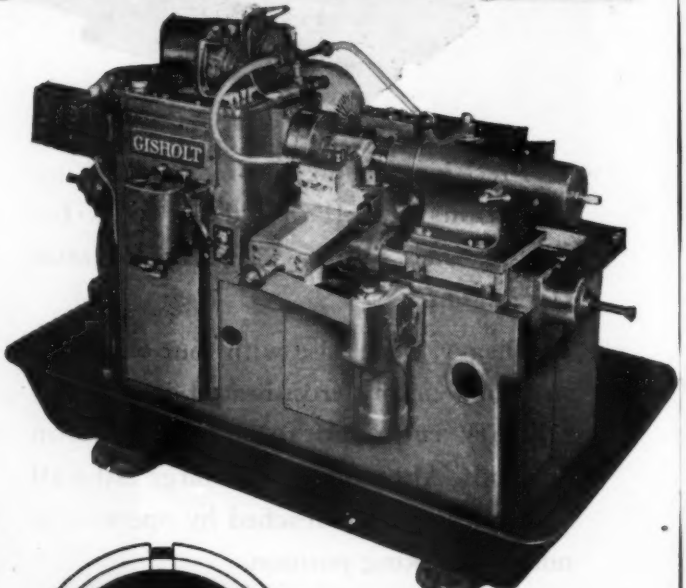
with the GISHOLT HYDRAULIC AUTOMATIC LATHE

This manufacturer, with aluminum pistons to turn out in large numbers, properly assigned the job to the Gisholt No. 12 Hydraulic Automatic Lathe. With the tool set-up shown here, the finish turning and grooving were done at a rate of 180 per hour, net.

Naturally, this calls for high spindle speeds; smooth, even feeds; quick approach and automatic return traverse of tools; easy operating tailstock, and an air-chucking fixture.

Those are the important things about the Gisholt Hydraulic Automatic Lathe. It's flexible, adaptable, fast . . . ready to handle a variety of between-centers or chucking work. And it's so easy to run that the operator has little to do but load the chuck, and remove the work when finished.

The Gisholt No. 12 means rock-bottom costs wherever the volume is sufficient to warrant automatic machining. Literature on request.



THE GISHOLT NO. 12 HYDRAULIC AUTOMATIC LATHE provides independent feeds for front carriage and rear slides with an infinite selection of feeds from .000" to .055". Slides feed to positive stops, insuring utmost accuracy in finished dimensions. Elimination of feed gears, mechanical trips, cams, etc., greatly simplifies changes of setup.

GISHOLT MACHINE COMPANY

1201 East Washington Avenue • Madison 3, Wisconsin

Look Ahead . . . Keep Ahead . . . With
Gisholt Improvements in Metal Turning

GISHOLT

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINE

It has all the "makings" of a refrigerated wall or shelf

Alcoa Aluminum tubing and sheet provide excellent heat-conducting properties, light weight, fine appearance, and long life. Furnace brazing joins the tubing to the sheet intimately and securely, making the assembly quickly and inexpensively.

What a combination for any manufacturer of refrigeration or air-conditioning equipment!

Men interested in determining what Alcoa Aluminum and brazed assemblies like this will do for their products can obtain metal for experimental purposes. We'll tell you how. Write ALUMINUM COMPANY OF AMERICA, 2107 Gulf Building, Pittsburgh 19, Pennsylvania.

Taking an aluminum tubing-to-sheet brazed assembly from the furnace.

ALCOA FIRST IN **ALUMINUM**

Its 10,000 to 1 *

THAT YOU'LL GET THE RIGHT TOOL WHEN YOU CHOOSE . . .

Thor

52 Basic Tools
90 Individual Models
254 Specialized Attachments
MORE THAN 10,000 POSSIBLE COMBINATIONS!

THERE'S 1* TO FIT YOUR NEEDS

PORTABLE ELECTRIC SCREWDRIVERS and NUTSETTERS

With more than 10,000 possible combinations of THOR models and attachments, even an inexperienced operator can match the quality work of oldtimers when equipped with THOR screwdrivers and nutsetters. By adjustment to the precise torque-tension desired, much of the essential experience that assures uniform tightness of screws and nuts is *built right into the tool!*

By choosing the right basic tool, the correct model and the most suitable attachment—what is practically a "custom-built" tool for the job is obtained. THOR Screwdrivers and Nutsetters take the "guess work" out of vital production assembly operations.

THOR *invented* the electric screwdriver. THOR Engineers have developed a *complete* line of screwdrivers and nutsetters for highest efficiency on every type of work. Today, THOR Tools are the production assembly tools of a "million uses" —because of their versatility and capacity to multiply the operator's output.

THOR'S POSITIVE TENSION CONTROL

Assemblers, using a THOR screw driver or nut setter equipped with a Thor Slip or Kickout clutch, can be sure that every Screw or nut will match *exactly* any predetermined tension requirement. No skill is necessary . . . No hit or miss adjustments—*Controlled Tension where precision is paramount!*

Thor PORTABLE Electric TOOLS

Branches in Principal Cities

Let a THOR representative help you select the *right tool* for your specific needs. Screwdriving and nut setting, among the commonest of all factory operations, offer a big opportunity for real SAVINGS. Investigate the possibilities NOW by asking a THOR representative to call.

INDEPENDENT PNEUMATIC TOOL CO., 600 W. JACKSON BLVD., CHICAGO 6, ILL. • NEW YORK • LOS ANGELES

BULLARD MULT-AU-MATIC . . . TYPE "DF"

Delivers* TWO *pieces at every index to reduce overhead and unit costs

Bullard 12-Spindle, Type "DF" MULT-AU-MATIC, . . . blueprint section shows example of twin-tooling at one station.

There is only one way to match the twin-spindle, twin-tooling output of the six or eight working stations of a Type "DF" Bullard MULT-AU-MATIC on work up to 8" in diameter and 10" in height . . . and that is to install two ordinary MULT-AU-MATICS. Yet the former costs only slightly more than *one* of the latter.

Consider how unit costs nose-dive when a twin-spindle MULT-AU-MATIC produces two finished pieces in the time of the longest single boring, turning, facing, threading, grooving or drilling operation plus the few seconds required for indexing.

To learn more about how Bullard Twin-6 and Twin-8 Type "DF" MULT-AU-MATICS deliver the kind of low-cost production needed to keep America working and buying at peak levels . . . write today for Bulletin "DF1".

From government surplus lists of available equipment select the better machines to replace those obsolete models you've been using on secondary non-critical operations. Ask Bullard for information on these old models by serial number. The Bullard Company, Bridgeport 2, Conn.

From Government Machine Tool Surplus Lists select the better machines to replace obsolete models you've been using on non-critical operations. Ask Bullard for information on these models by machine number.

BULLARD

CREATES *NEW METHODS*

TO MAKE MACHINES DO MORE

ARMSTRONG

The Armstrong System makes it easy to tool up efficiently

There is a right way to tool up every job—a correct tool of proper size, shape, cutting angle and strength . . . a type of cutter that will be most efficient for the material to be machined, the cutting speed and machining conditions. Comprising (1st) ARMSTRONG TOOL HOLDERS of over 250 sizes and shapes, (2nd) ARMSTRONG HIGH SPEED Bits, Blades and Cutters, (3rd) ARMALOY Cast Alloy Bits and Blades, and (4th) ARMIDE Carbide-tipped Cutters in both "Red" and "Grey" grades, the Armstrong System reduces the problem of correctly tooling-up for any operation on lathes, planers, slotters or shapers, to the selection of the correct ARMSTRONG TOOL HOLDER and the best suited cutter-bit.

In the Armstrong System your tool designing has already been expertly done for you, the new cutting materials and advanced machining methods adopted, the tests made, the "bugs" eliminated, and all engineering costs absorbed. You can buy efficient up-to-the-minute tooling "over the counter" from your local industrial distributor. To tool up this easy way is to tool up the right way. Plan your reconversion or post-war tooling around the Armstrong System of Tool Holders.

Buy ARMSTRONG TOOLS from your Supply House

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

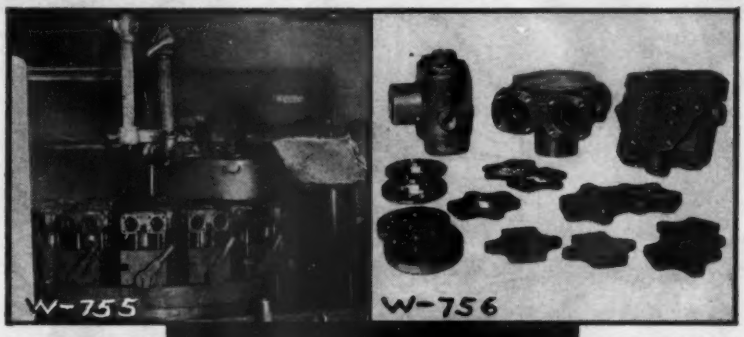
315 N. Francisco Ave. Chicago 12, Ill.

Eastern Whse. and Sales Office:
199 Lafayette St. New York 12, N. Y.

Pacific Coast Whse. and Sales Office:
1275 Mission St., San Francisco 3, California

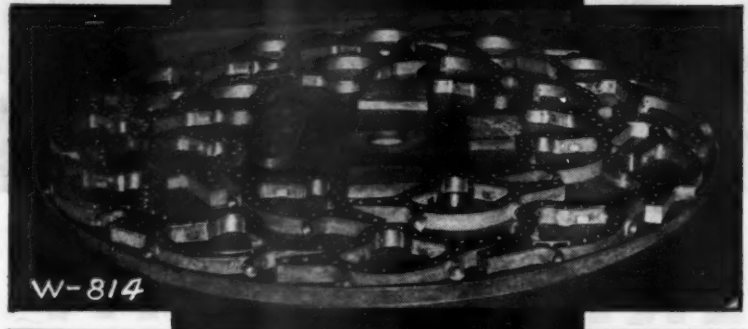
ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms

FOR CLOSE LIMITS-*Blanchardize*



The Blanchard No. 18 Surface Grinder is used to rough and finish-grind these oil burner parts, and .012″ of stock is ground off one side to limits of +.0003″ −.0001″. (48 per hour)

Eighteen of these cast iron ball bearing spacers, with eighteen smaller spacers inside of them are ground to limits of .0002″ after removing .025″ of stock. (144 surfaces per hour)



This is an excellent example of accurate surface grinding of pump body parts on a No. 18 Blanchard Surface Grinder. The material is high strength forged steel and .004″ of stock is removed from each side to limits of ±.0003″. (80 surfaces per hour)

These heat-treated steel trunnion bearings are ground on a No. 16-A2 Blanchard Surface Grinder. They are ground to limits of ±.0005″ after removing .005″ to .015″ of stock. (2315 per hour)

Send for your free copy of "Work Done on the Blanchard", third edition. This new book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

BLANCHARD

The **BLANCHARD** MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

20 SERIES PLAIN

NO 20
10" x 18"

NO 22
10" x 36"

BROWN &

FAST PRECISION GRINDING

-- WITH ALL THE ADVANTAGES OF ELECTRICAL CONTROL

Great flexibility of operation – manual or semi-automatic – on traversing or straight-in-feed production grinding

Close-fitting wheel spindle gives fine limits of accuracy, concentricity and micro-inch finish . . . consistently **repeated** at high production rates

Quick set-up with minimum effort

Powerful, sturdy construction – easy maintenance

GRINDING MACHINES

Electrically Controlled

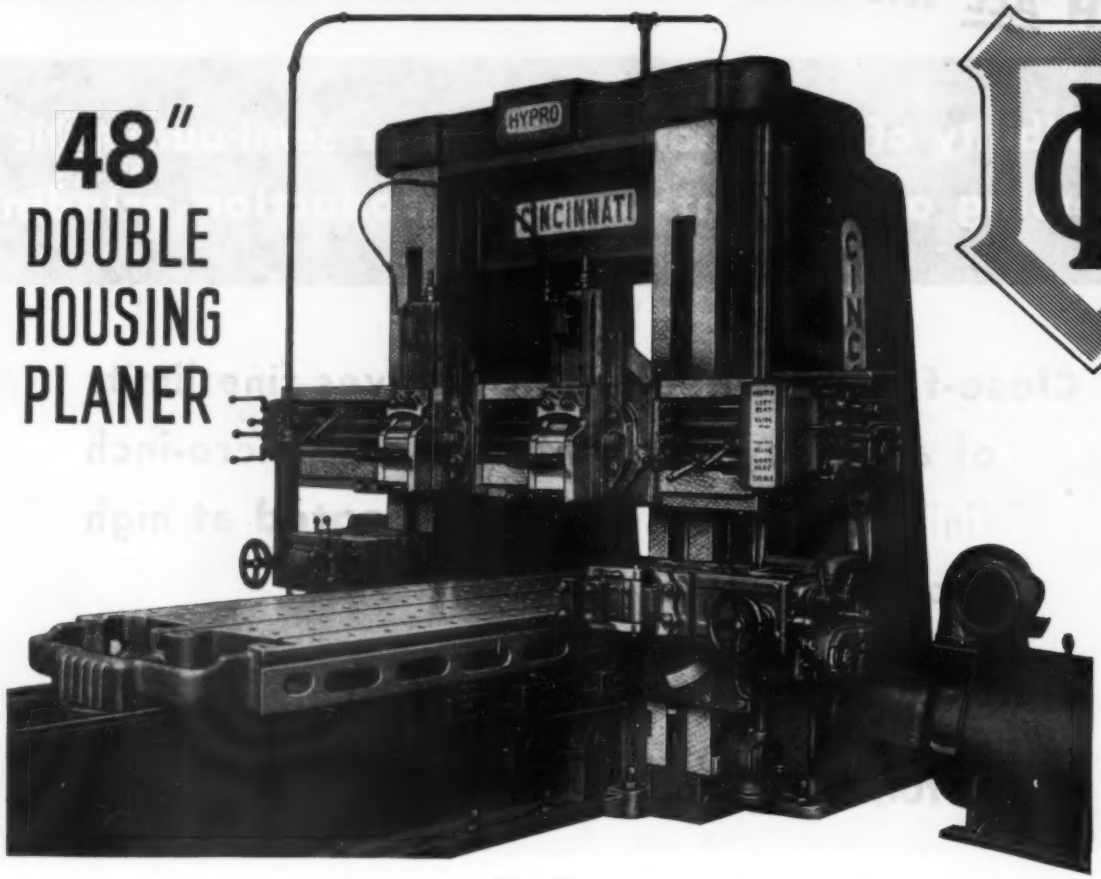
Investigate the production possibilities of these machines on *your* precision grinding of larger cylindrical work.

BROWN & SHARPE MFG. CO.
Providence 1, R. I., U. S. A.

SHARPE

CINCINNATI HYPRO

48" DOUBLE HOUSING PLANER



BETTER PLANING FOR LESS COST
At speeds up to 300 feet per minute

This newly designed Cincinnati Hypro Double Housing Planer is just as sturdy as it looks. Its massive pyramid housings, its liberal dimension and well built components assure the rigidity necessary for accurate planing.

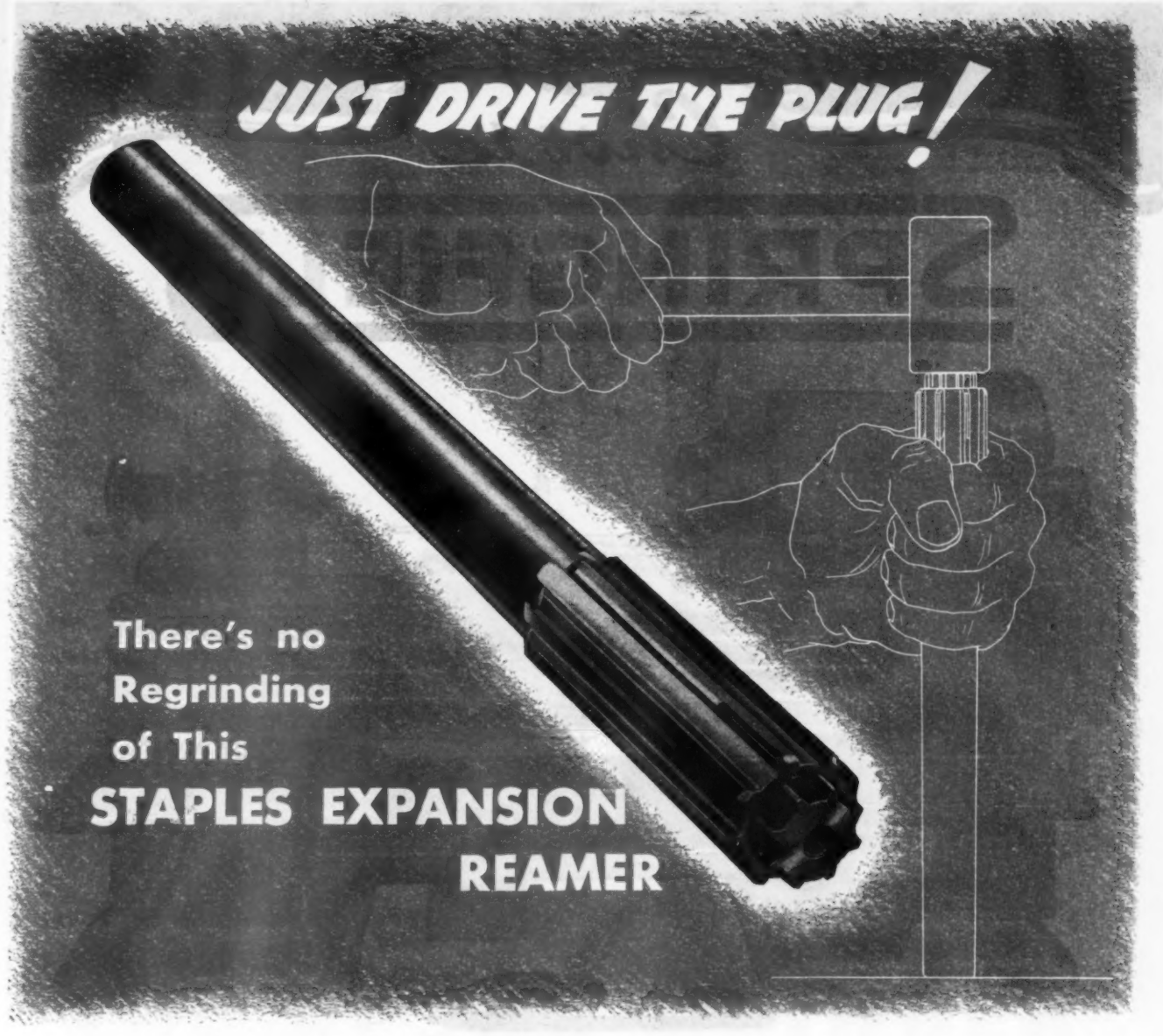
This 48" planer is the product of half a century's experience during which the metal working industry elected us by their patronage America's leading planer manufacturer.

Skill learned by our veteran craftsmen in building 7000 machine tools contributes fine workmanship to each new Hypro Planer.

Our engineers have added to the time tested Hypro-duction features many patented improvements that increase Cincinnati Planer accuracy, smooth flowing power and ease of control.

Write for Bulletin 136 illustrating Hypro Planer advantages

THE CINCINNATI PLANER COMPANY
Planers...Vertical Boring Mills...Planer Type Millers
CINCINNATI . OHIO . U.S.A.



To expand the Staples Expansion Reamer, you simply drive in the tapered expansion plug. As the tool body is solid—not split—you get uniform outward expansion. Cutting blades remain perfectly concentric.

For this reason Staples Expansion Reamers may be expanded several times without a regrind. The simpler, more rigid Staples construction — patent protected — gives greater accuracy, more reamed holes per grind, longer tool life.

Staples manufactures a full line of reamers, spot facers, counterbores, and other Carboloy-tipped circular cutting tools. Made originally to meet the precision standards of the aircraft industry, Staples Tools are now available for general use in the metalworking industry. Send for the Staples catalog of quality cutting tools, including *standard tools available from stock.*

Staples Tool & Engineering Company
Cincinnati 25 . . . . . Ohio

Staples CARBOLOY-TIPPED CIRCULAR CUTTING TOOLS

REAMERS • CORE DRILLS • SPOT FACERS • COUNTERBORES • END MILLS • SHELL END MILLS • ALSO A COMPLETE LINE OF CIRCULAR SPECIAL TOOLS

AUTHORIZED DISTRIBUTORS

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(Branches, Jacksonville, Miami, Tampa)
Chicago Screw Machine Supply
Cincinnati, E. A. Kinsey
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Dallas, Machinery Sales & Supply
Denver, Mine & Smelter Supply
Detroit, Sterling Supply
El Paso, El Paso Saw & Belting Supply
Erie, Neal & Co.
Houston, G. F. Cotter Supply
Knoxville, W. S. Murrian
Los Angeles, Machinists' Tool & Supply
Memphis, J. E. Dilworth
Minneapolis, John C. Eide
Muskegon, Muskegon Hdwe. & Supply
Newark, General Carbides
New Orleans, Murray-Baker-Frederic
Norfolk, Empire Machinery & Supply
Omaha, Fuchs Machinery & Supply
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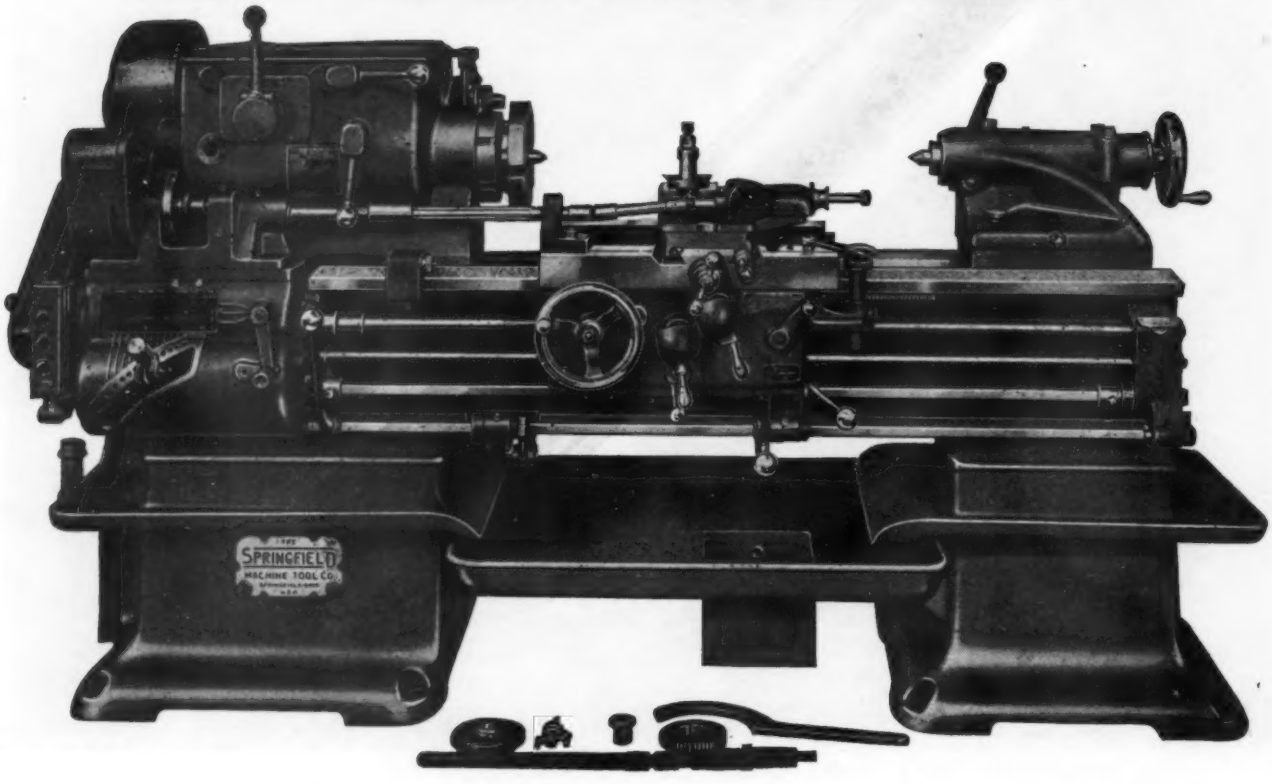
Toledo, Mill & Factory Supply
Tulsa, Marshall Supply & Equipment
Waterbury, White Supply
Waterville, Harold W. Kimball

Choose

SPRINGFIELD



GEARED HEAD LATHES

From the ground up, a SPRINGFIELD Lathe represents superior construction and design. All heavy castings, including the bed, are cast in our own shop . . . gearing is designed for maximum efficiency . . . attachments demonstrate unusual engineering ingenuity . . . lubricating systems and power transmission are built to take it, 24 hours a day. In fact, to fully understand what SPRINGFIELD can do for you, check their superior metal turning records in other shops . . . and judge for yourself.

Under current emergency conditions make it SPRINGFIELD Geared Head Lathe . . . they'll do your job better, now and later, too! Sizes range from 14" to 30". Write concerning deliveries, prices, etc.

The SPRINGFIELD MACHINE TOOL Co.

SPRINGFIELD OHIO U.S.A.

This

THOMPSON GRINDER

saves time . . . cuts costs . . . assures accuracy . . . on

DIE BLOCK GRINDING

● The Thompson type BB 12" x 10" x 24" Grinder is not only handling a difficult job easily and quickly but is maintaining original accuracy of die blocks.

The use of a 20" wheel on this machine permits re-grinding of die blocks without removing guide pins. This method of grinding eliminates inaccuracies in re-assembly and speeds up the job of maintaining the dies.

This is typical of the many ways Thompson Hydraulic Grinders are meeting specific grinding requirements—maintaining accuracy —and reducing ultimate grinding costs.

There's a Thompson Grinder for your job. A complete range of types and sizes are available from 6" x 12" x 18" to 36" x 36" x 240".

Write for bulletin.

THE **Thompson** GRINDER CO.

SPRINGFIELD OHIO

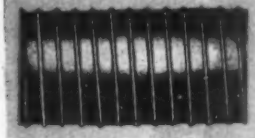
THREAD TOOL AND CUTTER

USED ON ANY SCREW-CUTTING LATHE FOR PRODUCING PERFECT THREADS

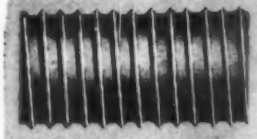
The Rivett Thread Tool mounts on lathe tool slide and takes the place of single point thread tools and chasers. The tool is a holder for a ten tooth cutter with means for indexing the cutter to present each of the ten teeth successively to the work. The first nine teeth rough out the thread in nine heavy, measured cuts, the tenth tooth finishes the thread. The ground cutter controls the perfect form and lead of the thread. The responsibility of the operator is reduced to indexing the cutter when reversing the lathe. A cutter can be furnished for threads up to 4" diameter in any form and in pitches of six threads per inch and finer.

Write for Bulletin 110

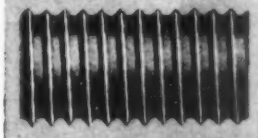
DEVELOPMENT OF THREAD AFTER PROGRESSIVE CUTS



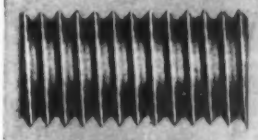
After Cut No. 1



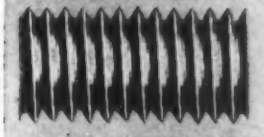
After Cut No. 3



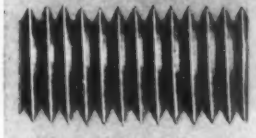
After Cut No. 5



After Cut No. 7



After Cut No. 9

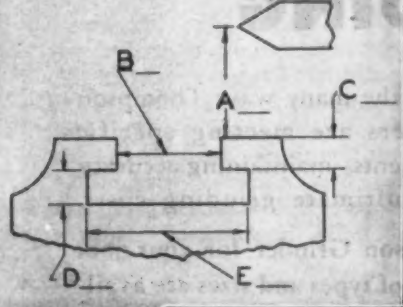


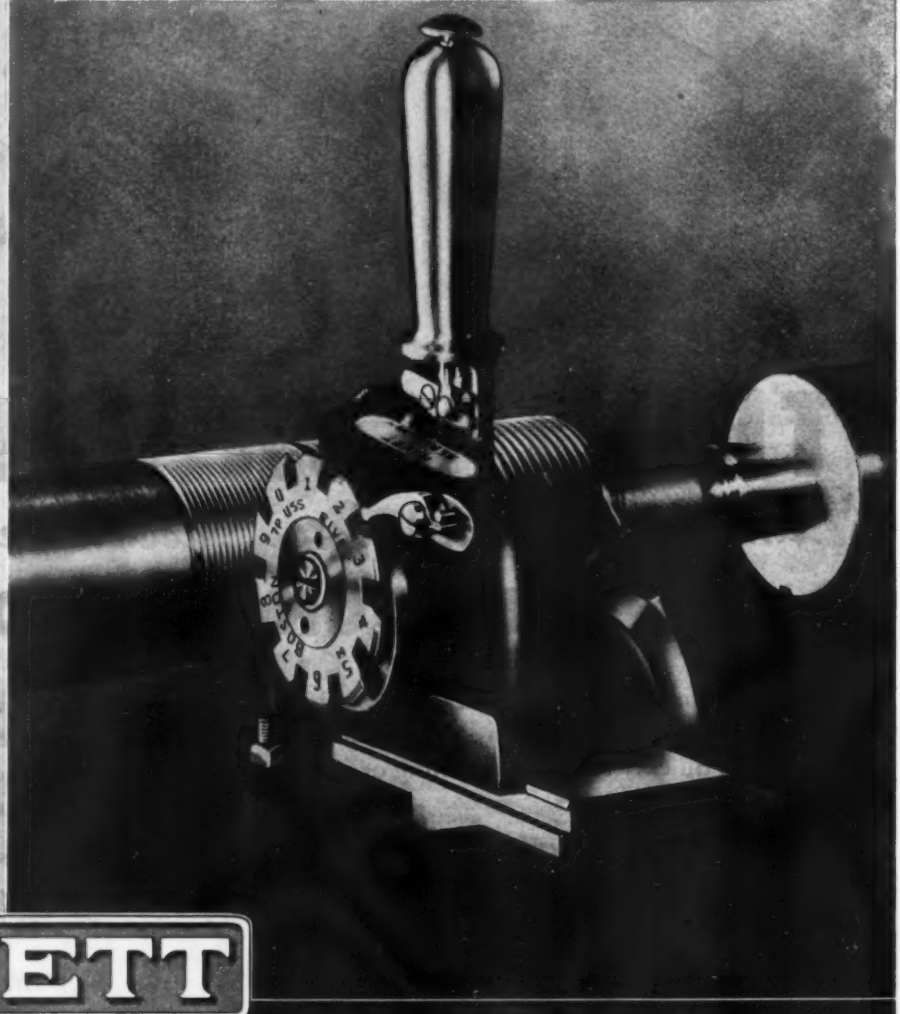
After Cut No. 10

INFORMATION REQUIRED TO FILL ORDER

Base to mount thread tool is machined to fit lathe tool slide and give proper height to cutter. Therefore the five dimensions, marked A-B-C-D-E, on diagram must be given.

A separate cutter is required for each pitch and form of thread. Therefore the form and pitch of each cutter must be given.

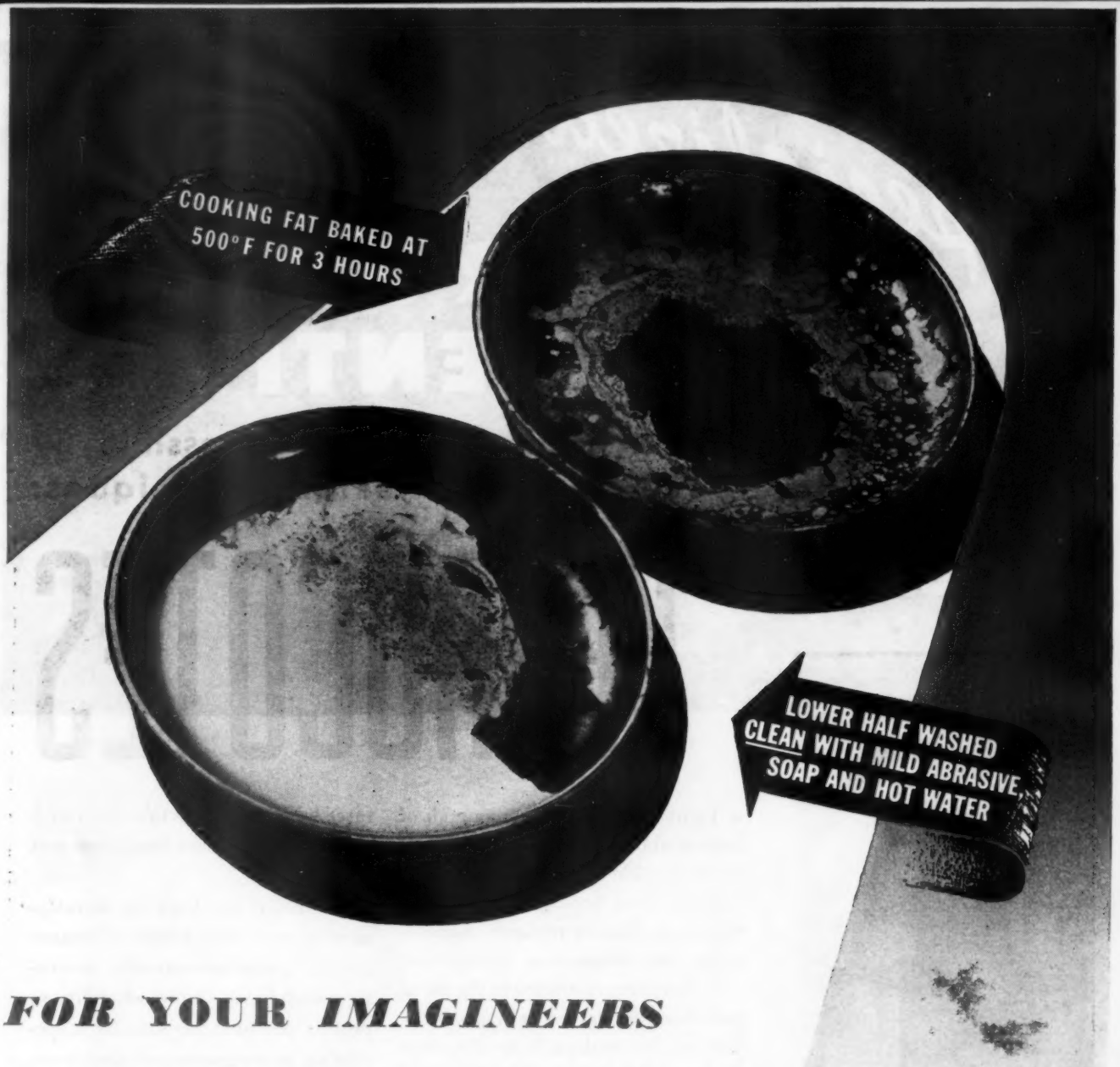




RIVETT

RIVETT LATHE & GRINDER, Inc.

BRIGHTON • BOSTON • MASS. • U. S. A.



FOR YOUR IMAGINEERS

...Alcoa offers this new stain-resisting finish for Aluminum

Stove and equipment manufacturers were asking for a stain-resisting finish for aluminum —for oven liners, grease pans and the like. So Alcoa set their Imagineers to work. The result is this new Alumilite* finish.

What intriguing possibilities this stain-resisting finish suggests! Added beauty for your products—increased efficiency through faster heat distribution—easier upkeep—because *now* you can use Alcoa Aluminum in so many new places.

To manufacturers interested in testing this finish, Alcoa offers samples and finishing service. ALUMINUM COMPANY OF AMERICA, 2107 Gulf Building, Pittsburgh 19, Penna.

*Registered trademark

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

Specialized CORROSION PREVENTIVES

. . . modern chemical compounds made possible by Quaker-developed advanced testing techniques:

QUAKER FERROCOTES

Quaker-developed "Dry-Type" Humidity Cabinet . . . one of 10 separate tests used in Quaker's Research Laboratory.

• To DEVELOP specific compounds of known ability to prevent corrosion under specific conditions of use . . . that is and has been Quaker's aim. In this work Quaker research chemists enjoy two tremendous advantages:

1. Not being restricted to the use of petroleum derivatives or by-products, they are free to draw from *all* sources of organic chemicals.

2. Having discarded most conventional methods of evaluating corrosion preventives as *too inaccurate*, Quaker research chemists have developed new and improved types of humidity cabinets and testing techniques.* These make possible accelerated laboratory tests that tie in with the many and varied conditions met in actual use.

The result has been the development of more than a score of FERROCOTES—*specialized* corrosion preventives each having a proved ability to protect precision parts under a specific set of environmental conditions.

A Quaker Process Engineer will gladly specify the particular FERROCOTES especially suited to protect your products . . . during processing . . . while in storage in your plant . . . during inter-plant shipment . . . and for final packaging.

Details of these will be sent on request to interested readers.

QUAKER CHEMICAL PRODUCTS CORP.

CONSHOHOCKEN, PA.

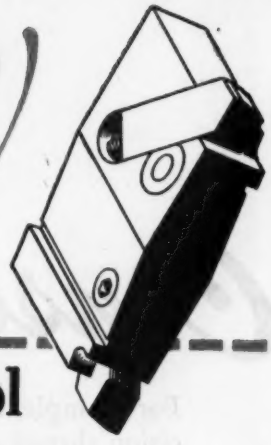
Other Plants in CHICAGO and DETROIT | Warehouse Stocks in Principal Industrial Centers

A Progressive Organization of Research and Process Engineers and Manufacturing Chemists

Name_____ Position_____

•••PLEASE PRINT COMPANY NAME AND ADDRESS IN MARGIN BELOW•••

new



Block Type Boring Tool

This quick detachable cutter block provides self-centering, positive locking, quick inserting of block in boring bar and easy removal, without the aid of locating holes or screws, keys, wedges or taper pins.

The block containing the fully adjustable blades is simplicity itself. Made to engage both sides of the precision ground flats on the bar it quickly and accurately centers itself. When located, the cutting thrust pressure is evenly distributed against the back and bottom of the slot.

This new tool combines quick change, positive drive and accuracy. Greater rigidity is assured because the bar is free from centralizing screw holes.

HOW IT WORKS: To Insert Block slip block through the slot in the bar until the projecting lugs engage the ground flats on the bar. It is then perfectly centered. Snap in spring clips which hold the block in place and effectively seal the unit from dirt, chips, etc.

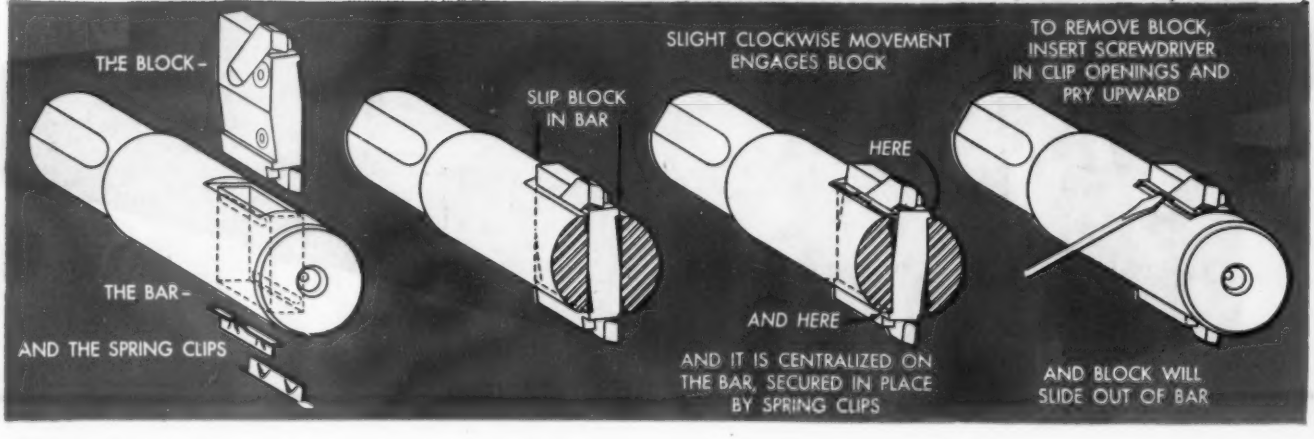
To Remove Block flip out clips, disengage the contact surfaces and withdraw the block.

Blocks can be reversed in bars for inverted operations.

Write for our illustrated folder describing these tools in detail.

GAIRING

THE GAIRING TOOL COMPANY, DETROIT 32, MICHIGAN


THE BLOCK –
THE BAR –
AND THE SPRING CLIPS
SLIP BLOCK IN BAR
SLIGHT CLOCKWISE MOVEMENT ENGAGES BLOCK
HERE
AND HERE
AND IT IS CENTRALIZED ON THE BAR, SECURED IN PLACE BY SPRING CLIPS
TO REMOVE BLOCK, INSERT SCREWDRIVER IN CLIP OPENINGS AND PRY UPWARD
AND BLOCK WILL SLIDE OUT OF BAR

ON YOUR PRECISION THREADING PROBLEMS

Consult LEES-BRADNER

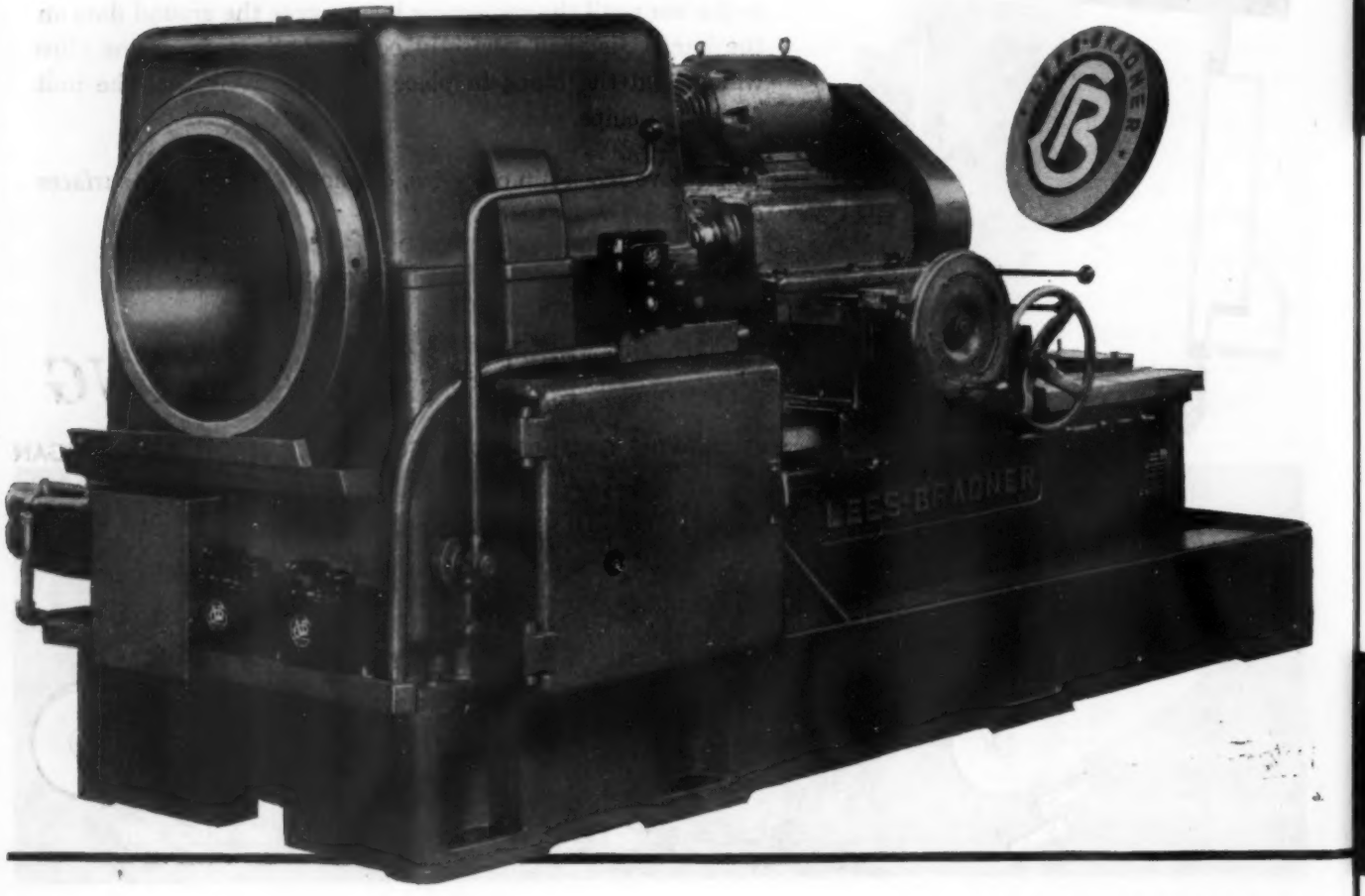
For example, the problem here was a precision thread on a large propeller blade shank. This heavy-duty chucking thread miller was designed and built to handle this type of work.

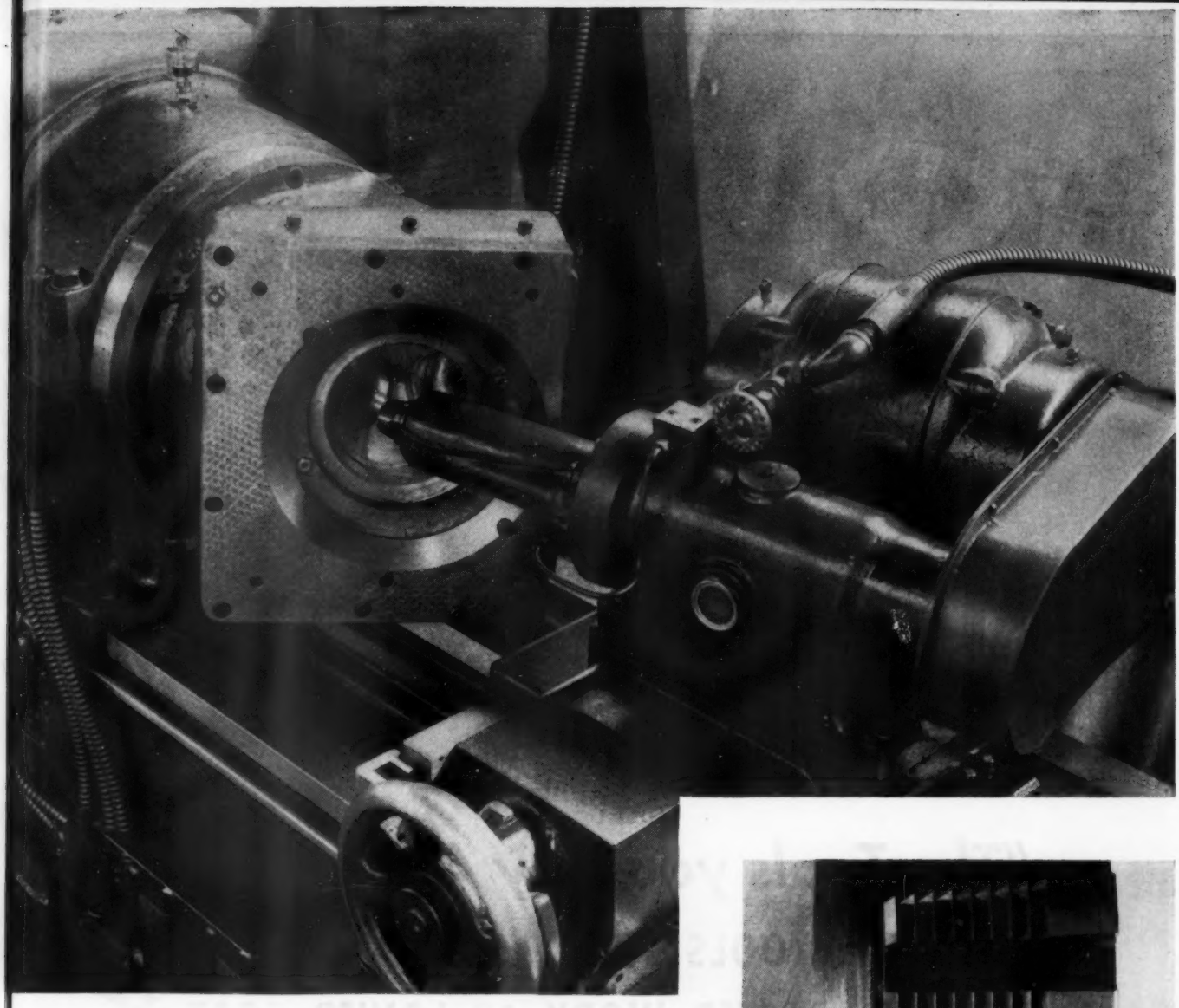
This precision tool is supplied with a 22″ bore through the work spindle, a Timken mounted cutter spindle, individual motor drives for cutter and work spindles, centralized controls, and high-speed rapid traverse.

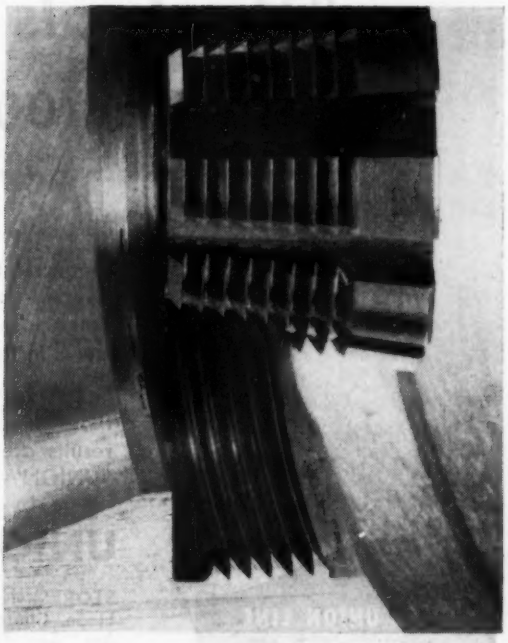
The one-piece bed and pan construction, extremely wide way sections, the liberal use of antifriction bearings, the employment of rugged short drives throughout and heavy-section castings result in a rigid heavy-duty machine ideally suited for the continuous production of precision threads.

Milling a buttress thread on the Lees-Bradner B. C. T. machine is accomplished with a taper thread hob mounted on a cutter spindle set at an angle. Increasing the pressure angle in this manner, the full edge of the hob tooth mills the thread with a resultant perfect form.

This special heavy-duty thread miller will mill a buttress form thread from 0° to 7°. It is milling a 0° buttress form thread on the work illustrated.







● The product of the largest manufacturers of thread milling machines in the United States—Lees-Bradner has both the experience and facilities to develop equipment that will help you with your precision thread milling problems. Feel free to call on them.

The LEES-BRADNER Company

CLEVELAND 11, OHIO, U.S.A.

UNION

"The Tools you Buy Again"

ARE THE TOOLS THAT ASSURE BETTER, FASTER WORK AT LOWER COST

Longer lasting accuracy and greater all-round efficiency of UNION tools under stepped-up production demands are the direct result of careful selection of materials, close production control through every step in manufacture and developments in tool design which only long, specialized experience can create.

Better, faster work at lower cost should be the determining factor in selecting those small tools which play such a big part in today's production. Because such results are consistently attained with UNION TOOLS, the wisdom of specifying "UNION" is apparent.

UNION TWIST DRILL CO., Athol, MASS.

STORES—New York: 61 Reade St., Chicago: 11 So. Clinton St., Detroit: 5527 Woodward Ave., San Francisco: 121 Second St., Los Angeles: 524 E. Fourth St., Seattle: 568 First Ave., South.

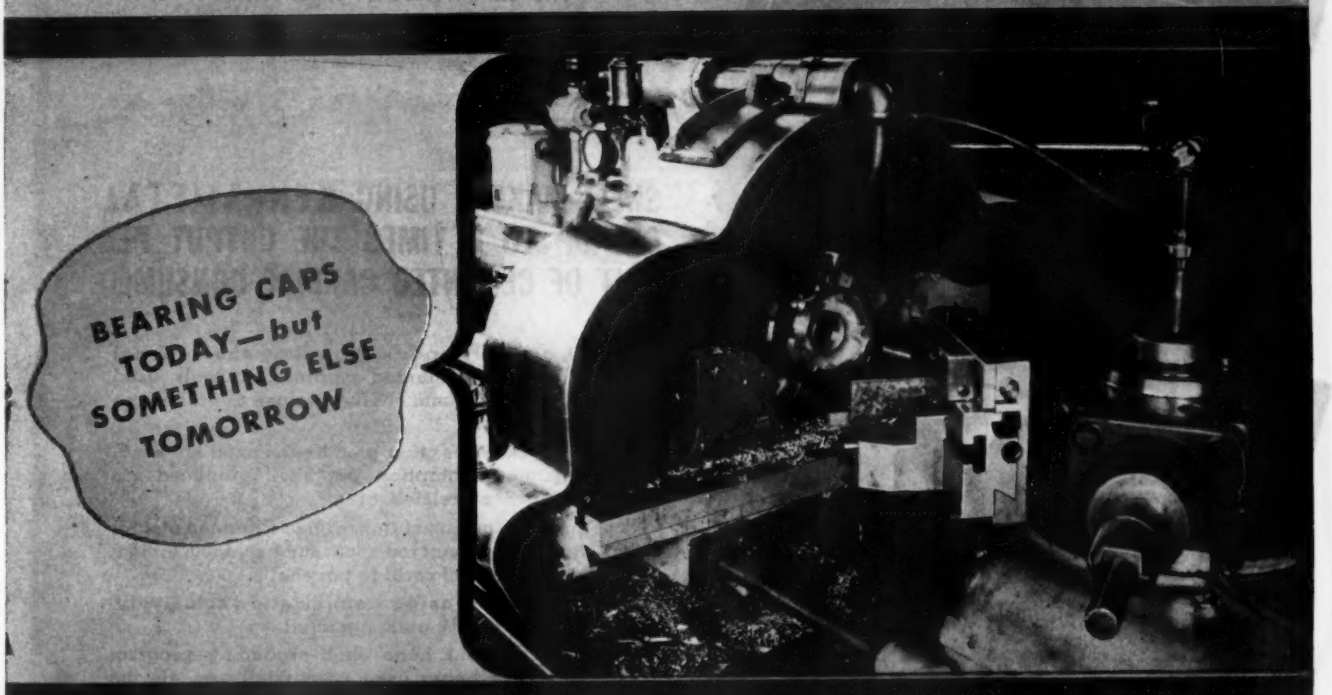
MANUFACTURING DIVISIONS

S. W. Card Mfg. Co. Div., Mansfield, Mass.
Butterfield Div., Derby Line, Vt.
Butterfield Div., Rock Island, Quebec.

The UNION LINE
TWIST DRILLS
MILLING CUTTERS
REAMERS
HOBS
SLITTING SAWS
END MILLS
TAPS
DIES
SCREW PLATES
PROFILE CUTTERS

UNION

Now's the time to look into the Retooling Possibilities--of your P&J EQUIPMENT...



Probably most P & J machines on war work today will soon have other jobs to handle. The type 4D H.S. P & J Automatic is no exception. As shown here it is busy turning out bearing caps in a nationally-known shop, maintaining close tolerances, keeping costs down and holding to fast production schedules.

This machine, however, is not shackled to the work it is doing. It can be readily changed over for the production of other parts by the comparatively simple procedure of re-tooling, with all original speed, convenience and accuracy retained.

Your P & J equipment can also be converted to other use. P & J engineers, with their long specialized experience in tooling, can help you extend the utility of your machines. Why not find out immediately just what the possibilities are and how you can take advantage of them. Outline your problem and ask for our recommendations.

The POTTER & JOHNSTON MACHINE CO.
PAWTUCKET, R. I.

P & J REBUILDING
Service

P & J offers complete facilities in its shop for thorough rebuilding of customers' P & J Automatics. This service assures restoration of machines to original productivity and accuracy. Retooling can also be handled at the time of rebuilding.

IT'S THRIFTY — and PATRIOTIC—to save with BONDS . . .

IF YOUR BUSINESS IS MACHINING *STEEL*

THE EXPERIENCE OF AMERICA'S SHELL-MAKERS IS SIGNIFICANT

SHELL-MAKERS USING KENNAMETAL GET UP TO 6 TIMES THE OUTPUT PER UNIT OF CEMENTED CARBIDE CONSUMED

Recent official reports regarding the national consumption of cemented carbides on tools used for machining 105 mm shells disclose the following significant facts:

Where carbides other than Kennametal are used, the average consumption per shell produced has been about 3 calculated grams.

Four large manufacturers who use Kennametal for 50% to 100% of their tools, consume on the average, only ¾ of a gram of carbide per shell.

Three plants using Kennametal exclusively, average less than ½ gram per shell.

In the current huge shell-producing program Kennametal is being used successfully on all the large sizes for roughing, finishing, facing, cutting off, grooving, and chamfering, as well as for de-burring of band grooves with a distinctive lathe file.

The properties of Kennametal that produce such notable results for shell makers are equally valuable to any company in the business of machining steel. Even the toughest alloys, and those having a hardness up to 550 Brinell, can be readily machined at economy-promoting speeds, and with unusually long tool life.

The effective constituent of steel-cutting Kennametal is tungsten-titanium-carbide ($WTiC_2$), which distinguishes it from all other cemented carbides, and is a major reason for its outstanding success.

Kennametal field engineers are fully experienced in the application of cemented carbide tools. They will be glad to help you on any steel machining problem.

KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL *Inc.*, LATROBE, PA.

TREAT 'EM RIGHT

Keep Your Carbide Tools in the Fight

CONSERVE THE TOOLS YOU HAVE!

If you follow a few simple rules now, you can avoid a critical tool situation in your plant. Handle all your present carbide tools with "kid gloves"—treat 'em right—and they will give better service, do all that is asked of them, and enable you to meet your greatly increased production schedules.

For practical information on how best to conserve your carbide tools and save delays, get in touch with Firth-Sterling.

3 RULES
THAT CONSERVE TOOLS

HANDLE 'EM WITH CARE
Carelessness may damage cutting edges.

KEEP 'EM SHARP
Re-sharpen *in time!* A dull edge slows production.

GRIND 'EM PROPERLY
Find out the right way—and *do it.*

Firth-Sterling
STEEL COMPANY

FIRTHITE

J&L SPECIAL COLD DRAWN SHAPES

bright, smooth, accurate—special cold drawn steel sections save machining in countless applications. Our metallurgical engineers will be glad to discuss your production problems with you.

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION

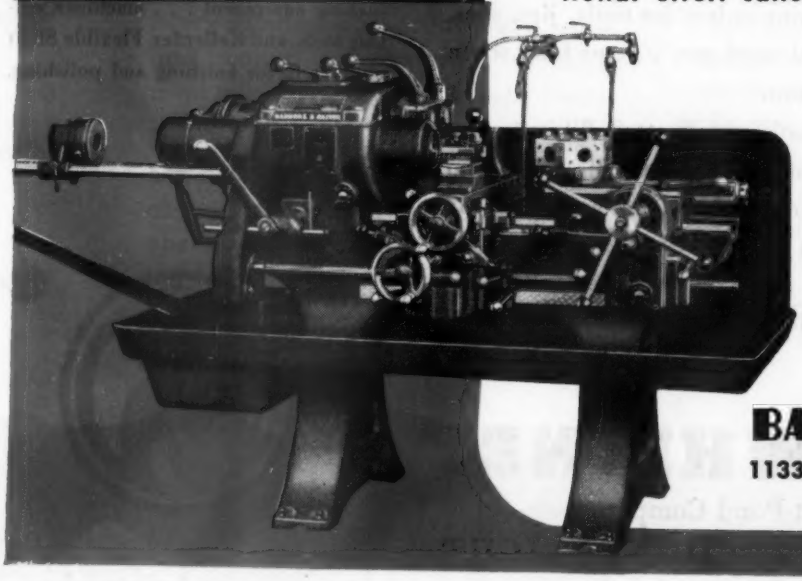
PITTSBURGH 30, PENNSYLVANIA

More GEAR BLANKS per day—

because

THE HYDRAULIC SPINDLE BRAKE STOPS THE CHUCK INSTANTLY. No extra effort is required by the operator. By moving the control lever from driving to neutral position, a powerful yet elastic multiple disc brake is applied. No loss of time, no additional effort called for. The chuck is ready for unloading and re-loading.

This is only one of several new features recently incorporated in The Bardons & Oliver No. 3 Universal Turret Lathe.



BARDONS & OLIVER, INC.
1133 WEST 9TH STREET CLEVELAND 13, OHIO

No wonder your dies are tops..

YOU'RE PRATT & WHITNEY EQUIPPED

No die shop customer can fail to be impressed when he sees Pratt & Whitney machine tools at work on precision equipment he is buying. He knows that he can expect just that much better quality and accuracy . . . two things he vitally needs as he lays his plans . . . for now and the future.

Remember this when you place your orders for tools, jigs, dies, fixtures and other equipment that you need now . . . or later when you swing back into civilian production.

Accuracy breeds accuracy . . . that's why Pratt & Whitney has earned such an enviable reputation among tool and die shops who pride themselves on turning out the finest quality work. For 85 years, the Pratt & Whitney standards have never changed. Keep an eye peeled for the Pratt & Whitney name on machine tools, small tools, and gages in the shops you pick to make your tools. It will pay dividends.

Working swiftly and accurately, this P&W Die Sinker not only lowers the costs of die sinking operations, but leaves such an excellent finish that hand work in every way is very much less. Ask us to tell you about P&W die making equipment . . . machines, cutting tools, and Kellerflex Flexible Shaft equipment for finishing and polishing.

PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD 1 • CONNECTICUT

SUN SPIRITS

cuts costs . . . eliminates mixing and heating

Every minute counts . . . and any loss of time in our all-out production is a detriment to our men on the fighting fronts.

Delays and high costs had seriously handicapped one manufacturer until he changed solvents in his metal cleaning operations. Previously, required heating caused a lag in production.

The trouble stopped when they switched to Sun Spirits. Time was saved because heating was eliminated. Parts were cleaned faster . . . and at a saving of 25% over their previous method!

If you're cleaning metal, let Sun Spirits help save time and reduce costs in your plant. Write for your free copy of "Case Histories of Cleaning Up War Parts."

SUN OIL COMPANY • ***Philadelphia 3, Pa.***

Sponsors of the Sunoco News Voice of the Air—Lowell Thomas

SUNOCO

SUN INDUSTRIAL PRODUCTS

OILS FOR AMERICAN INDUSTRY

FIRST...wherever

HERE'S WHY
4 Companies prefer Warner & Swaseys

The final test of any machine tool is its ability to turn out more good production in less time. Here are four cases, among many, where carefully kept production figures prove beyond any doubt that Warner & Swasey turret lathes are more profitable.

COMPANY A

using Warner & Swaseys, turns out 12 shell caps per machine per shift. On another make of machine, same capacity, tooled exactly the same, only 8 shell caps could be made . . . a 50% increase for the Warner & Swaseys.

COMPANY B

kept records carefully for 8 years; proved it could machine a 12" gate valve on a Warner & Swasey at a cost lower than that for turning a 6" valve on another make of turret lathe of same capacity.

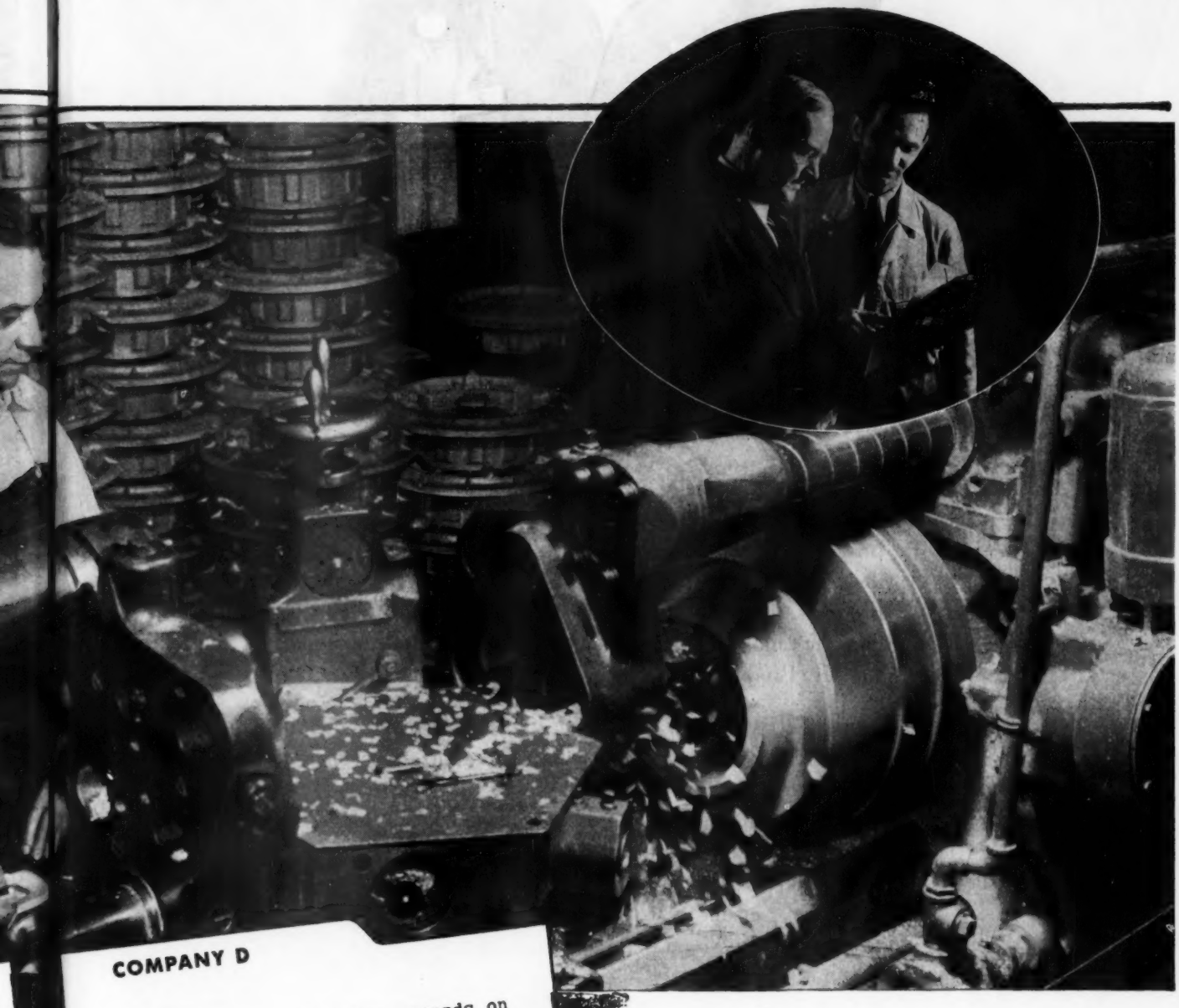
COMPANY C

machines magnesium wheels. On Warner & Swaseys, cutting at 2300 feet per minute, it has reduced time per piece from 45 minutes to 7 minutes . . . a time saving of 85%.

WARNER & SWASEY · CLEVELAND · OHIO

TURRET LATHES, SADDLE AND RAM TYPES · CHUCKING

production records are kept!



COMPANY D

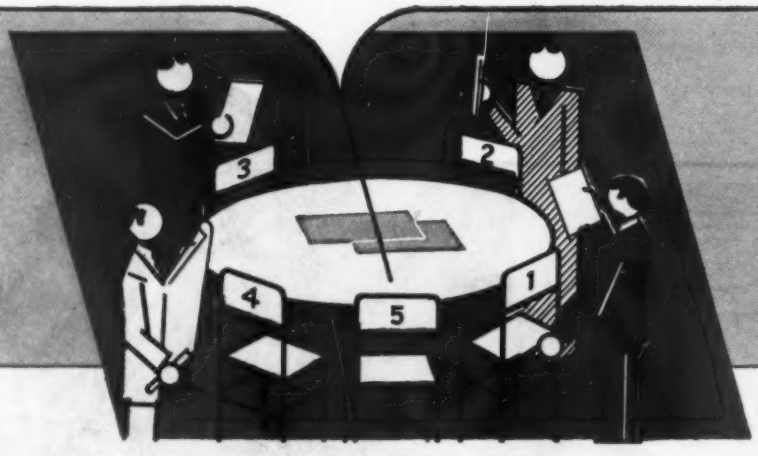
with accurate production records on every machine tool in its plant, reports that "the difference in profit between Warner & Swaseys and _____ (a similar machine) is so great that it is almost unbelievable."

Far from being isolated instances, these reports are typical of almost every plant that has kept accurate cost records. Why not ask your Warner & Swasey field engineer to help plan your next machine tool expansion for greater productivity . . . and more profit per machine. Write Warner & Swasey, Cleveland, Ohio.

You Can Machine It Better, Faster, for Less . . . with a Warner & Swasey

AND BAR TOOLS · PRECISION TAPPING AND THREADING MACHINES

TOOL ENGINEERING CO. REPRESENTATIVE



IS CHAIR NO. 5 VACANT AT YOUR BOARD OF STRATEGY?

The board of strategy of a typical modern manufacturer has a chair for the market research expert who learns what changes in the product customers want to meet their new needs. It has a chair for the technical research expert who tests new materials and improved products. There's a chair also for Mr. Product Designer, Mr. Production Chief, Mr. Advertising and Selling and an important chair for Mr. Production Engineer and Tool Designer.

Except in the case of industrial giants some of these chairs can best be filled by independent specialist organizations such as Market Research organizations, Research Laboratories, Advertising Agencies, and Production Engineers and Tool Builders. Such organizations are staffed with specialists who can bring a wealth of collateral experience to your problem, and viewpoints that can only be gained by serving a variety of clients. Vulcan can bring this asset to your chair No. 5.

ENGINEERING • PROCESSING • DIES
DESIGNING • GAUGES • BUILDING
TOOLS • JIGS • SPECIAL MACHINERY

ASK FOR THE BROCHURE

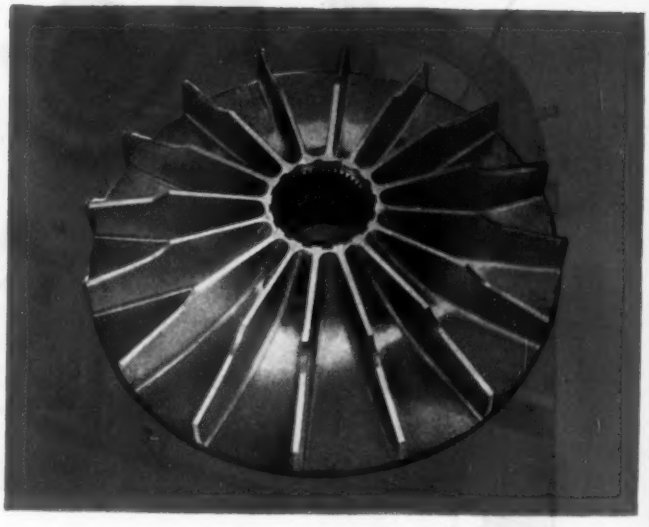
The VULCAN TOOL *Co.*

213 NORTH BECKEL STREET DAYTON 3 OHIO

CARBIDE-TIPPED PROFILE STRADDLE MILLING CUTTER

BARBER-COLMAN ENGINEERED MILLING CUTTERS

ARE FIGURED FOR LOW TOOL COST PER PIECE PRODUCED . . .

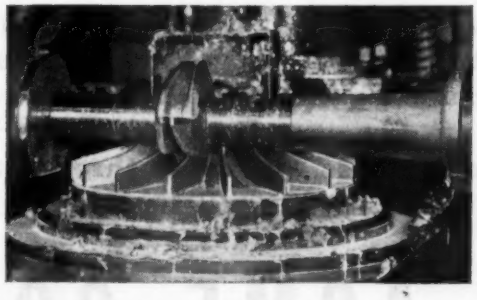


The cutter shown above straddle mills 16 fins on this forged aluminum supercharger impeller. The cutter runs at 1303 r.p.m. with a feed of 24" per minute at the beginning of the cut. This feed is automatically reduced to 6" per minute for heavy cutting near the hub.

WHEN you are planning a production milling job and come to the question of what kind of cutters to use, *get in touch with Barber-Colman.*

Our Milling Cutter Engineers can help you by recommending the *right* cutter for any kind of a milling job. In some instances, they may suggest a standard cutter, in others a standard cutter with slight modifications, in still others a special cutter *engineered for the job.* But whatever the recommendation, it will be aimed at giving you the lowest practical tool cost per piece produced.

In this example, a specially engineered carbide cutter on the job resulted in 60% lower cutter cost per piece produced than originally obtained with high speed steel cutters. After considering all factors — dimensions, limits, material, amount to be removed, spindle speeds available, type of machine, quantity to be run — it was decided that carbide cutters would serve the job best. Special profile type straddle mills were designed with 3 teeth, cast iron body, and cemented carbide tips.



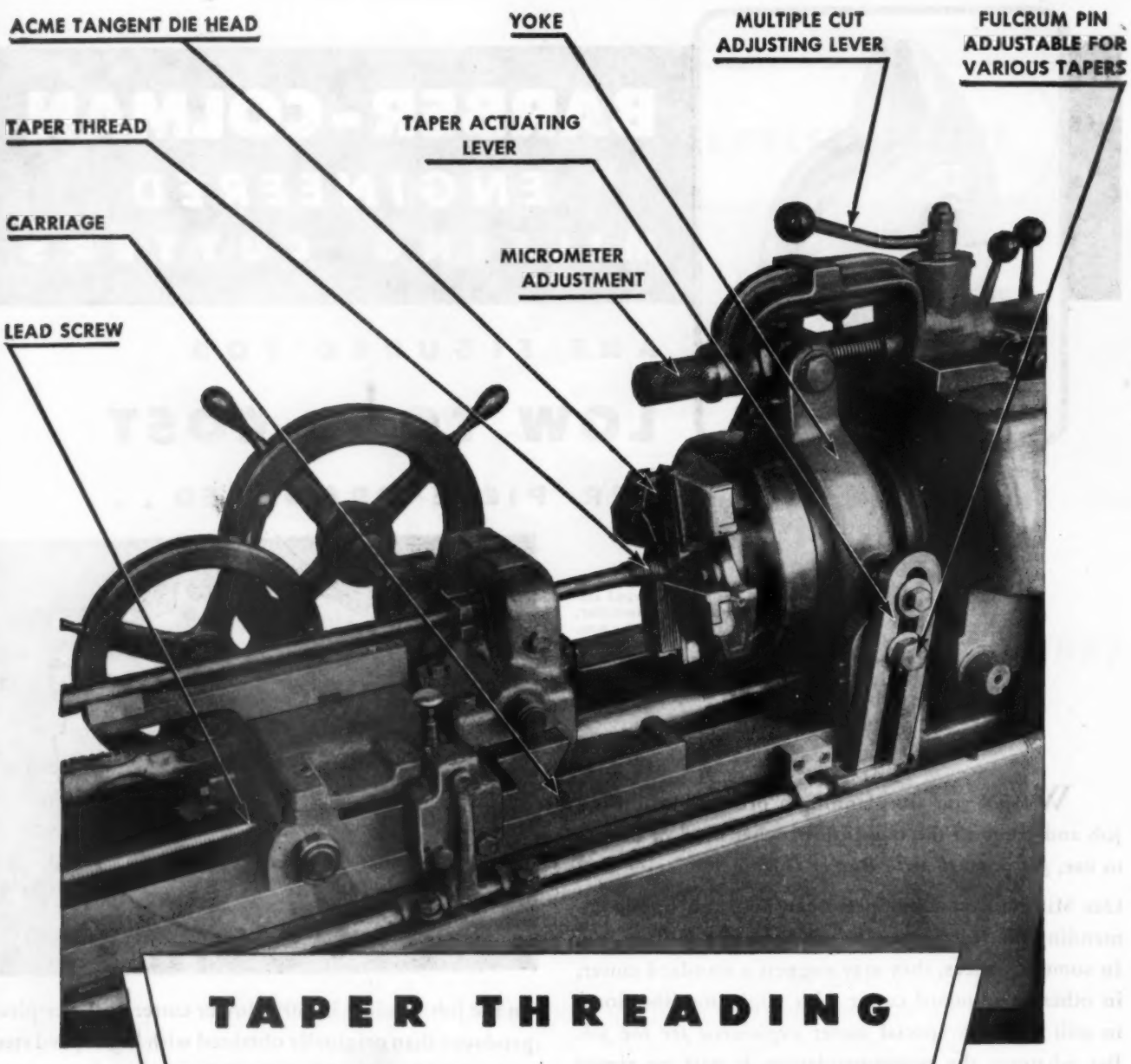
Close-up of the machine set-up for straddle milling supercharger impeller fins. Sixteen fins are milled in 6 minutes, with automatic feed cycle and index. The cutter delivers 600 pieces per sharpening.

Barber-Colman Milling Cutter Engineers *are ready to help you.* If you are interested in lower tool cost, send data and let us make a recommendation and quotation.

BARBER-COLMAN COMPANY

HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

GENERAL OFFICES AND PLANT • 111 LOOMIS STREET • ROCKFORD, ILLINOIS, U.S.A.



TAPER THREADING

HERE IS a simple, positive attachment for Acme Tangent Die Head to accurately cut taper threads on pipe, locomotive staybolts, etc. on the Acme XL Threading Machine.

This taper threading attachment is actuated by a lever pivoting on an adjustable fulcrum pin, one end of which is attached to the die head yoke controlling the expanding movement of threading dies.

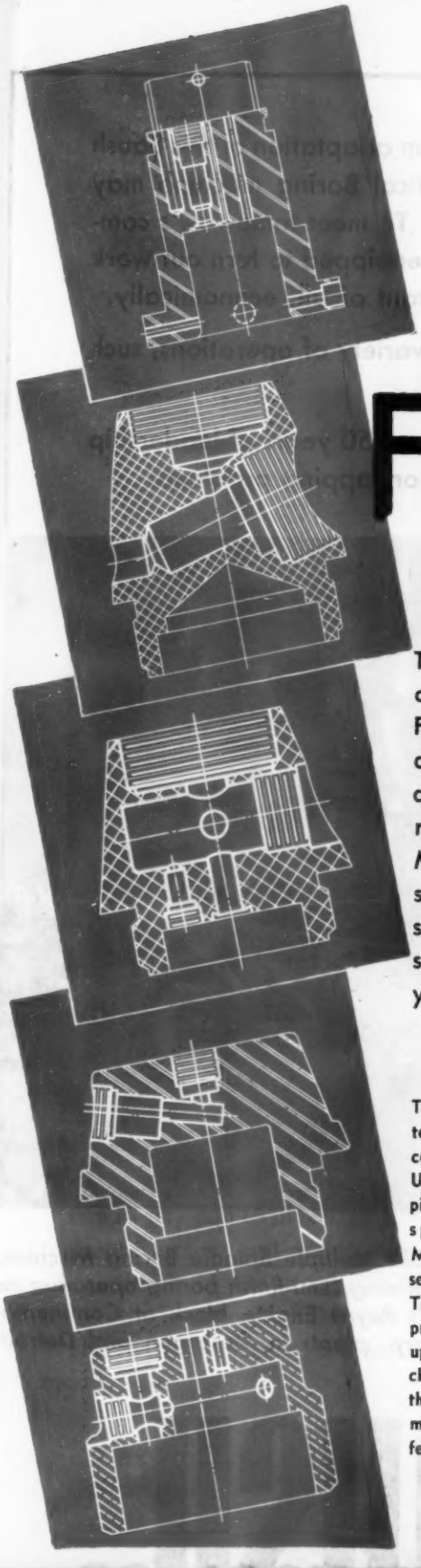
Leadscrew controlled carriage synchronizes work with desired taper.

Taper threads are cut from the small diameter to the large diameter.

THE HILL ACME COMPANY

ACME MACHINERY DIVISION • 4535 St. Clair Ave. Cleveland 14, Ohio
ESTABLISHED 1882

FORGING · THREADING · TAPPING · BOLT · NUT · RIVET MACHINES • ALSO MANUFACTURERS OF HILL HYDRAULIC SURFACE GRINDERS • "CANTON" ALLIGATOR SHEARS AND PORTABLE FLOOR CRANES



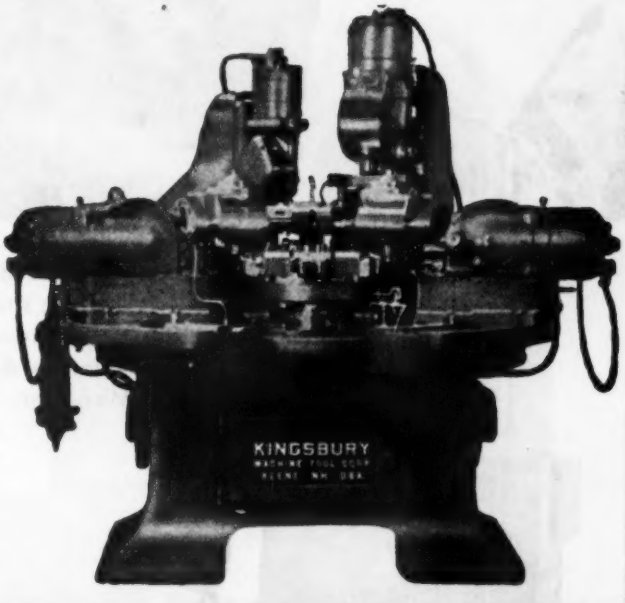
Intricate Fuse Parts Produced with Minimum Number of Chuckings

FLEXIMATIC

by KINGSBURY

The blanks for these shell fuse parts are taken from automatics and completed in from one to four handlings. Kingsbury FLEXIMATICS make it possible to perform in a single chucking a dozen or more highly intricate machining operations on fuse and rifle components and similar parts where speed and accuracy are essential to successful National Defense production. Munitions production presents a three-fold problem . . . high standards of accuracy, pressing production demands and scarcity of skilled labor. Kingsbury FLEXIMATICS provide—in a single machine—the efficient means to solve all three phases of your defense production problems.

The FLEXIMATIC system of construction consists of Standard Units for drilling, tapping, boring, reaming, spot-facing, etc. Mounted on one of several standard bases. This unique method provides a flexible set-up which can be changed over to meet the machining requirements of many different parts.



KINGSBURY MACHINE TOOL CORPORATION

KEENE NEW HAMPSHIRE U S A

HAVE YOU A *Boring Problem?*

Perhaps an adaptation of this Baush W-8 Vertical Boring machine may solve your problem. To meet tomorrow's competition, your production line must be equipped to turn out work speedily, accurately, and most important of all, economically.

Special purpose machines easily tooled for a wide variety of operations, such as the unit illustrated, will be the answer.

Why not have a Baush Engineer—backed by more than 50 years of leadership in this field—look into your boring, drilling, reaming or tapping problems.

Baush W-8 Vertical Hydraulic Multiple Spindle Boring Machine, with six spindle head, performing semi-finish boring operation on six cylinder bores for Rolls Royce Engine block at Continental Aviation & Engineering Corp. plants in Muskegon and Detroit, Michigan.

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GULF QUALITY PETROLEUM PRODUCTS

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THESE PLANTS are typical of hundreds in every industry that have secured many worth-while benefits directly as a result of the superior performance of Gulf quality lubricants, quenching and cutting oils.

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It will pay you to investigate these more efficient production and maintenance tools. They are available to you through 1200 warehouses located in 30 states from Maine to New Mexico. Write, wire, or phone your nearest Gulf office today.

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With Gulf Super-Quench, this plant gets more uniform hardness in every shell, improved machinability, and greater production.

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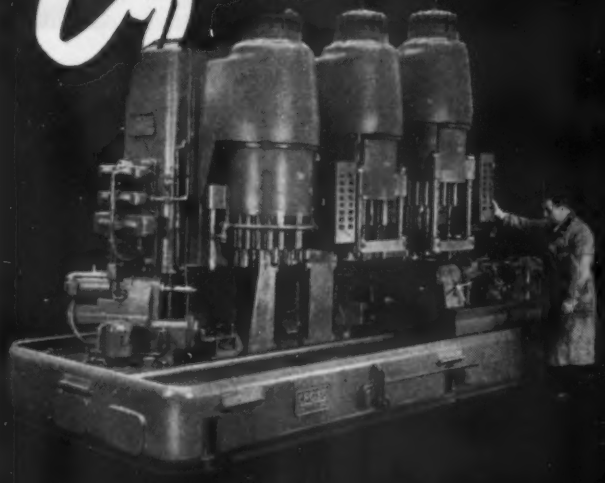
Equip for the Job!

MILLING cylindrical, conical or flanged work externally or internally.

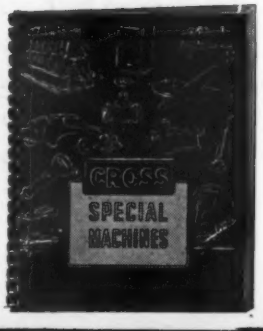


DRILLING, COUNTERSINKING and TAPPING the assembly holes in the bowl face of truck axle housings on Cross 3-Station Automatic Transfer Machine.

DRILLING and TAPPING five holes simultaneously in cylinder blocks with Cross Automatic Transfer Machine.

MILLING with both sides of a cutter in finishing two aircraft crankcases simultaneously.

Send for **the new Cross Catalog which contains 35 detailed case histories of successful Cross *Special Machines*. For your copy, write on your letterhead to The Cross Company, Detroit 7, Michigan, Department 121.**



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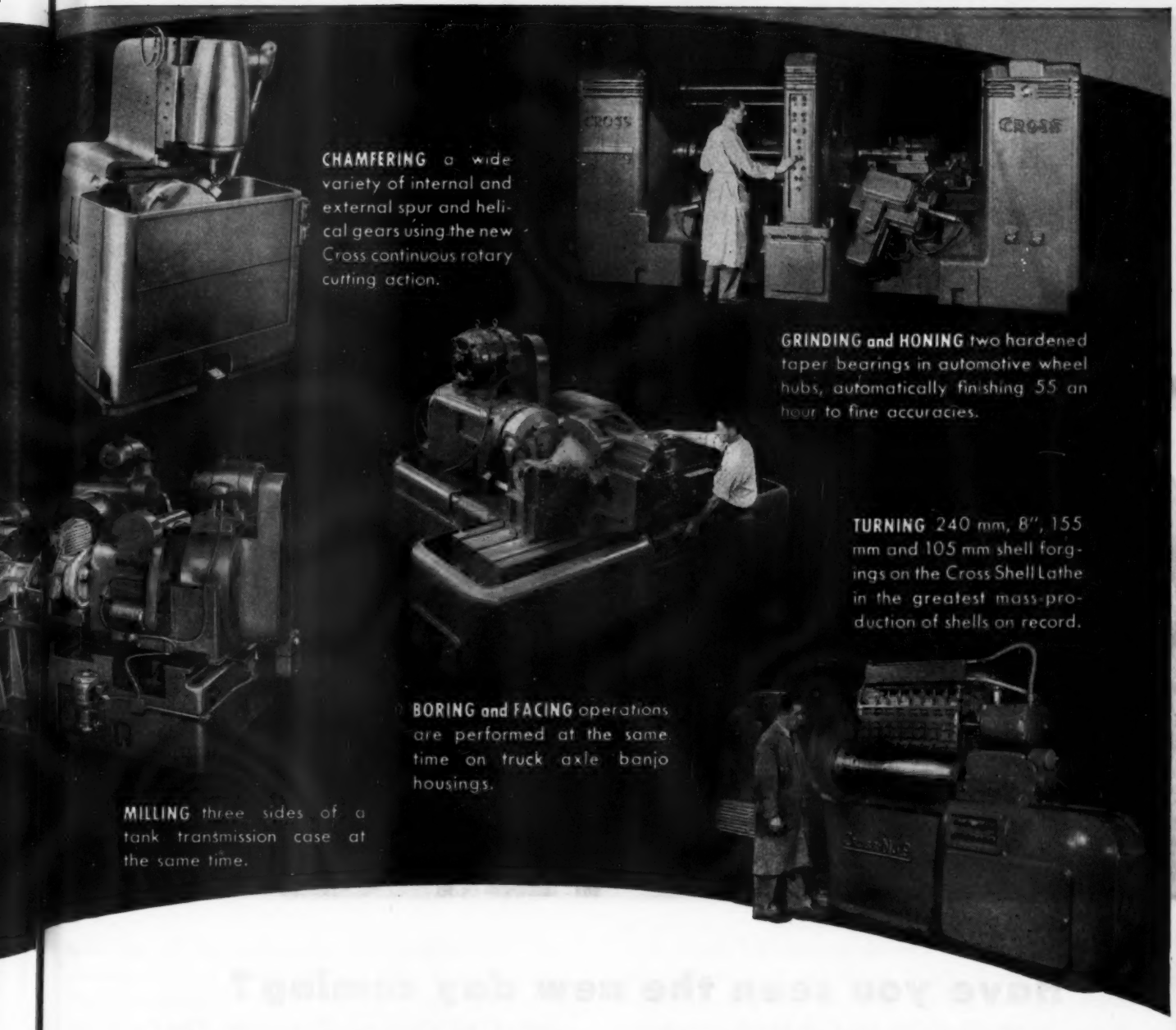
CHAMFERING a wide variety of internal and external spur and helical gears using the new Cross continuous rotary cutting action.
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Dollars invested in Cross Machine Tools deliver maximum performance *with maximum profit.* Each machine is individually engineered and custom built *to suit the work*—capacity, production, horse-power, handling facilities, floor space, perishable tool and price factors are carefully balanced and brought into focus on the ultimate function: production for profit.

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S-19

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for automatically performing any one or a combination of metal cutting operations
TURNING · MILLING · DRILLING · BORING · REAMING · TAPPING · GRINDING

Have you seen the new day coming?

Even in the pre-dawn darkness of war there are signs that it is on the way. . . . It *can* be the greatest day the world has ever known.

Already men, materials and American ideals have penetrated to the last wildernesses of the earth. There's a trans-Atlantic flight every 13 minutes of the day and night . . . 160,000 miles of air routes being flown by American transport planes . . . our air strength is double that of the rest of the world combined . . . our manufacturing productivity half of the world's total capacity. We have what it takes to force prosperity and to *enforce* peace.

We at Bryant feel that we're part of the new day that's coming. Our record in war links us with great production achievements, from the millionths-of-an-inch precision in the modern airplane engine to the millions of things that we'll help to produce more simply, faster, for less. We urge you to call us in now!

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ELECTRONIC CONTROL OF FEED RATE

Thy-mo-trol drive operates the work feed on this Sundstrand-built "copy mill", which cut fin-milling time 35 per cent.

HELPS CUT FIN-MILLING TIME 35%

● **For one of the war's most vital machining jobs**—aluminum cylinder heads for aircraft—the Sundstrand Machine Tool Company has developed a special machine which automatically mills fins on the walls of the forgings. Using this machine, a leading engine builder now completes these heads in 35 per cent less time than was required with a conventional feed drive.

Key to the increased production is optimum-speed machining, despite continual changes in depth of cut. G-E Thy-mo-trol drive gives precise control of feed motor speeds over a range from 175 to 1750 rpm. By means of its sensitive electronic control, it varies the feed rate automatically in inverse proportion to the load on the spindle motor. Light cuts go fast, deep cuts go slowly, and the fragile cutter required for this fin milling operation is kept loaded to the maximum safe working capacity.

Operated from an a-c power source, G-E Thy-mo-trol drive supplies closely controlled d-c power for stepless control of speed and torque over an unusually wide range. Thy-mo-trol drives are being "built-in" to all kinds of machines where power demands are between 1/8 and 25 hp. Grinders, milling machines, turret lathes, and thread mills are among the machine tools whose production has been stepped up by their use.

A co-ordinated set of equipment, Thy-mo-trol drive includes d-c motor, electronic panel, transformer, and control station. G-E engineers will help you select and apply Thy-mo-trol to your machines, or explore their suitability for new functions. Ask for Bulletin GEA-4025. *General Electric Co., Schenectady 5, N. Y.*

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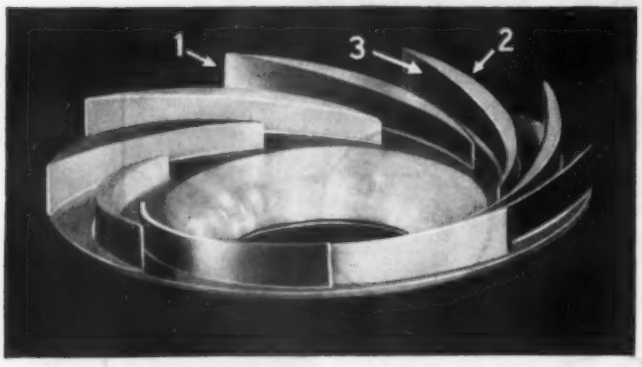
Buy all the BONDS you can—*and keep all you buy*

THY-MO-TROL DRIVE

THREE *Snyder* SPECIALS *for* MILLING DIFFUSER PART



One of the chief objectives in creating these three special milling machines was to reduce to a minimum the need for costly, time-consuming hand finishing operations on an aircraft diffuser part.

First operation uses a vertical, two-spindle, end-milling machine to mill a 1/32" radius on each end of the nine diffuser vanes. End mills are installed on eccentrically mounted quill housings which rotate through nearly 180°. Two-spindle head, motor and drive mechanism slide into position hydraulically, supported by two guide bars. Part is clamped on nine-station Geneva index table. This machine is essentially a Snyder 3 v 14 drilling machine with special equipment.

Second operation uses a vertical, single-spindle miller with side milling cutters set on an angle to the vertical center line. Besides feeding the cutter down, moving the entire slide in and out and rotating the table at feed rate, it also is necessary to keep the cutting edge of the milling cutters tangent to the various radii which make the contour of the vanes. Therefore it was necessary to rotate the spindle housing angularly in correspondence to the in-and-out movement of the main slide. This operation is completed in nine passes.

Third operation uses a vertical, single-spindle end mill in which the housing follows the contour of the part by cam action. Part is rotated at feed rate through an arc while the vertically feeding spindle housing is moved in and out through cam action. All three actions of the feed mechanism—feeding cutter up and down, moving in and out and rotating the part—are mechanically synchronized.

On the basis of time and money saved, these machines are an excellent investment. Perhaps there are opportunities for similar savings in your present or prospective production program. We invite your inquiries. *Snyder Tool & Engineering Company, 3400 E. Lafayette Avenue, Detroit 7, Michigan.*

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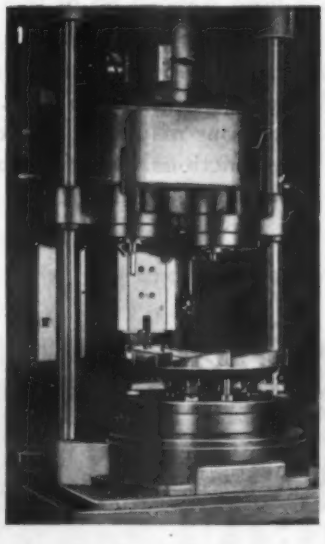
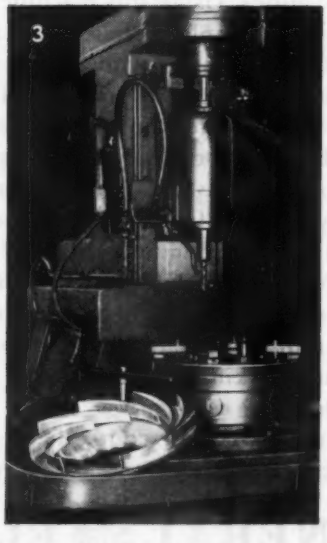
20 Years of Successful Co-operation with Leading American Industries





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Aircraft gears which formerly were ground in 40 minutes, floor to floor, are now being shaved in 5 minutes. Tooth surfaces of the shaved gear are as good or better than those of the ground gear and dimensional tolerances are just as closely maintained. Furthermore, in shaving there is no chance of surface cracks due to high frictional temperatures encountered in grinding.

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RED RING PRODUCTS

PRECISION AERIAL PHOTOGRAPHY MAPS THE ROAD TO VICTORY...

World War II has seen tremendous strides in aerial photography — potent weapon of modern war. Fairchild Camera and Instrument Corporation has played a leading role in the development and perfection of the precision aerial camera. The Fairchild model presented in this milling story is the K-18 — designed expressly for high-altitude intelligence photography, requiring large area coverage and large image size. Intended primarily for vertical photography, it is also used for low-altitude obliques. Equipped with lens of 24-inch focal length; 9 inches by 18 inches negative size; fully automatic or manual operation.

Fairchild CAMERA

— *Photo and data: courtesy Fairchild Camera & Instrument Corp.*

Milling a film magazine seating surface for the Fairchild K-18 camera with special fly cutter on Milwaukee 3-H Vertical Milling Machine. Material: magnesium alloy; speed: 1500 rpm; feed: 7⅝ inch per minute; cutter: 3-inch diameter with 2 tool bits; larger diameter tool bit: positive rake 20°, helix angle 15°, holder 3 inch, set-in 3½ inch; bottom tool bit: helix angle 0°, positive rake 25°, holder 3 inch, set-in 2 inch (cuts 5/32-inch lower than larger diameter tool bit); path, cutting distances: 20 inches wide x 15 inches across, cutting four sides; supporting wall 3/16 inches thick; 10 minutes milling time.

PRECISION milling of thin walled magnesium and aluminum castings is difficult. Mirror finishes are usually a must, notwithstanding the amount of stock to be removed.

On this Vertical Milwaukee Milling Machine the rate of cross feed is exactly the same as the rate of table feed—resulting in a uniformity of surface and mirror finish over the entire milled area.

Milwaukee Milling Machines are especially adapted for this type of operation. Their three bearing spindle mountings assure smooth vibrationless operation at the sustained high speeds usually used in milling these metals.

TO MILL IT WITH SPEED... PRECISION... PROFIT

— PUT IT ON A

Milwaukee

KEARNEY & TRECKER CORPORATION
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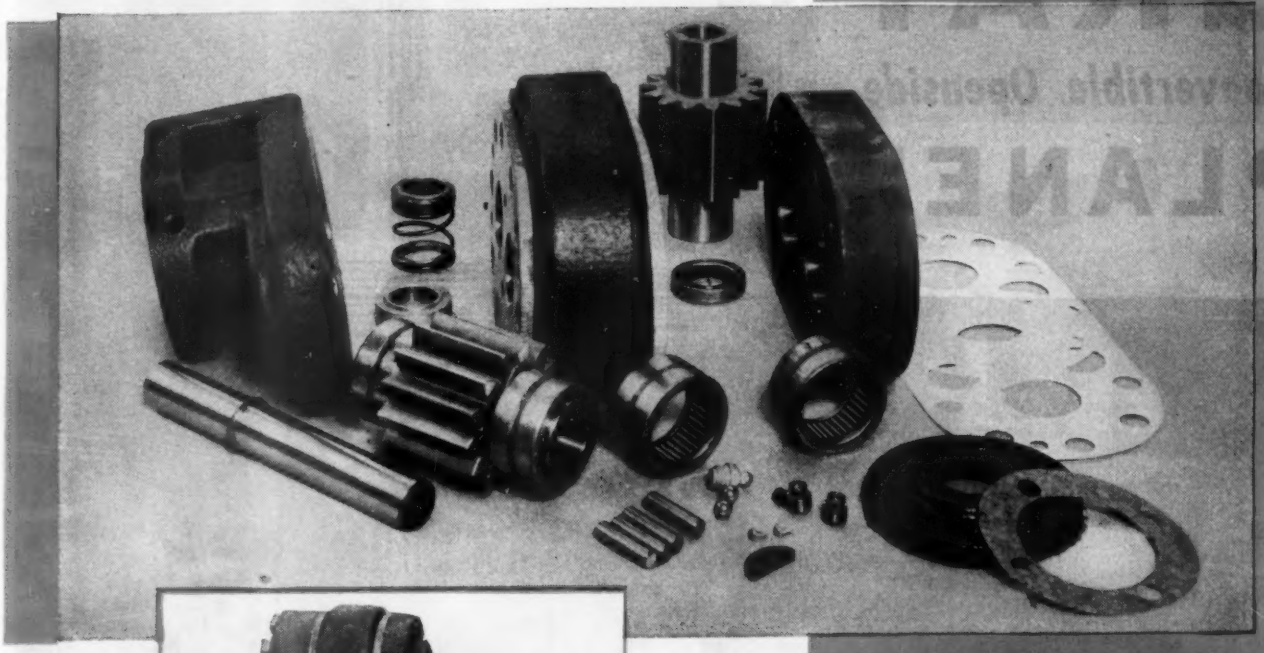
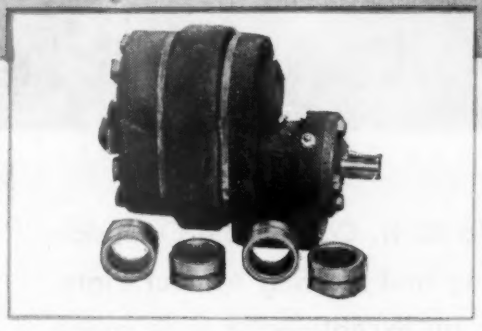
Easily Installed
IN COMPACT ASSEMBLIES!

This Gear Type Hydraulic Pump, made by the Commercial Shearing and Stamping Co., shows how the smooth-running protection of Orange Roller Bushings is obtained in a compactly designed product, where space is limited and operating requirements are severe.



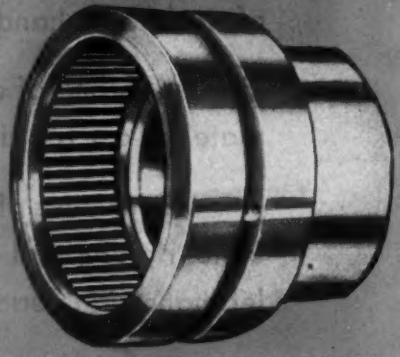


"Simplify it" . . . "make it more compact", are the never-ending goals of every design engineer. You'll find no more useful ally in this accomplishment, than Orange Roller Bushings.

The ability to carry heavy loads or to run at high speeds with very little space requirements, has enabled Orange Roller Bushings to help many an engineer out of "tight spots" in a compactly designed product.

Made to extreme standards of precision, Orange Roller Bushings have much closer running clearances—thus assuring true alignment of the rollers with the raceways. Smooth, long-life operation is assured. Send coupon for Engineering Data Book showing full range of types and sizes, capacities, installation data, etc. Consult our engineers on any bearing application.

ORANGE
ROLLER BUSHINGS



Mail Coupon for Engineering Data

Orange Roller Bearing Co., Inc., AM
Orange, N. J.

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Company.....

Address.....

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GRAY

Convertible Openside

PLANER

● Here is a heavy duty 132" x 96" x 30 ft. Convertible Openside Planer designed and built for planing and scarfing Armour Plate. The convertible construction permits an exceptionally wide range of work to be handled.

Located in one of our Navy yards this machine is planing armour plate for our rapidly expanding fleet.

This machine has all the advantages of an Openside, plus the additional rigidity and convenience of a Double Housing Planer with a left hand side head.

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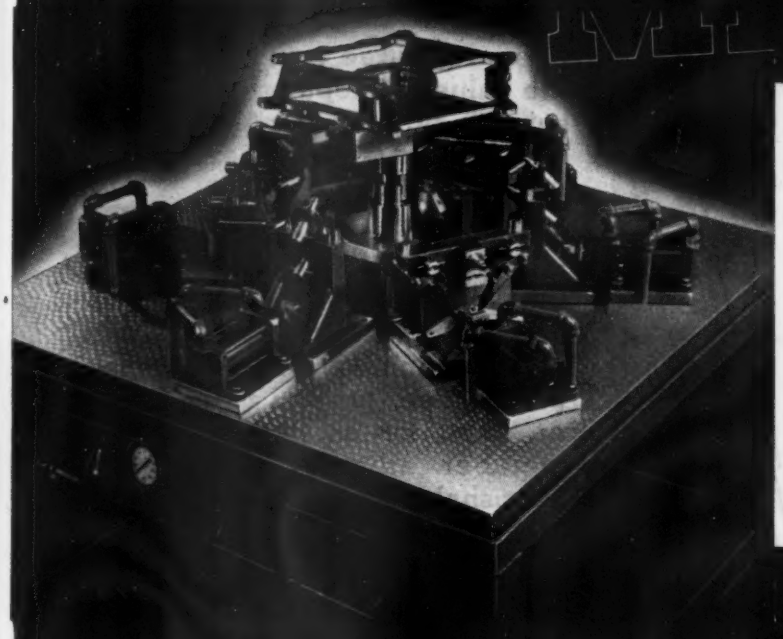
THE GRAY LINE — Double Housing and Openside Planers, Switch Planers, Die Block Planers, Double-Housing and Openside Milling Planers, Planer Type Milling Machines, Horizontal Boring Machines.

Everybody knows



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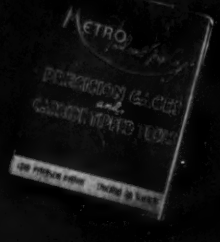
are well-known to American industry, either through use or reputation. Proved through peacetime production . . . doubly proved by the higher tempo and greater requirements of wartime production, Metro Gages and Carbide Tipped Tools are in a position to be doubly approved both by the men on the production line and by the dealers who supply them in the postwar years. Ask us, too, about special tools and gages for special jobs. Metro engineers will design them for you or make them up from your specifications.



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Kempsmith Arbors in all popular sizes and types are regularly carried in stock. Every one is a precision-built tool, adaptable to ANY make of milling machine equipped with standardized spindle. Fill in and mail coupon for bulletin.

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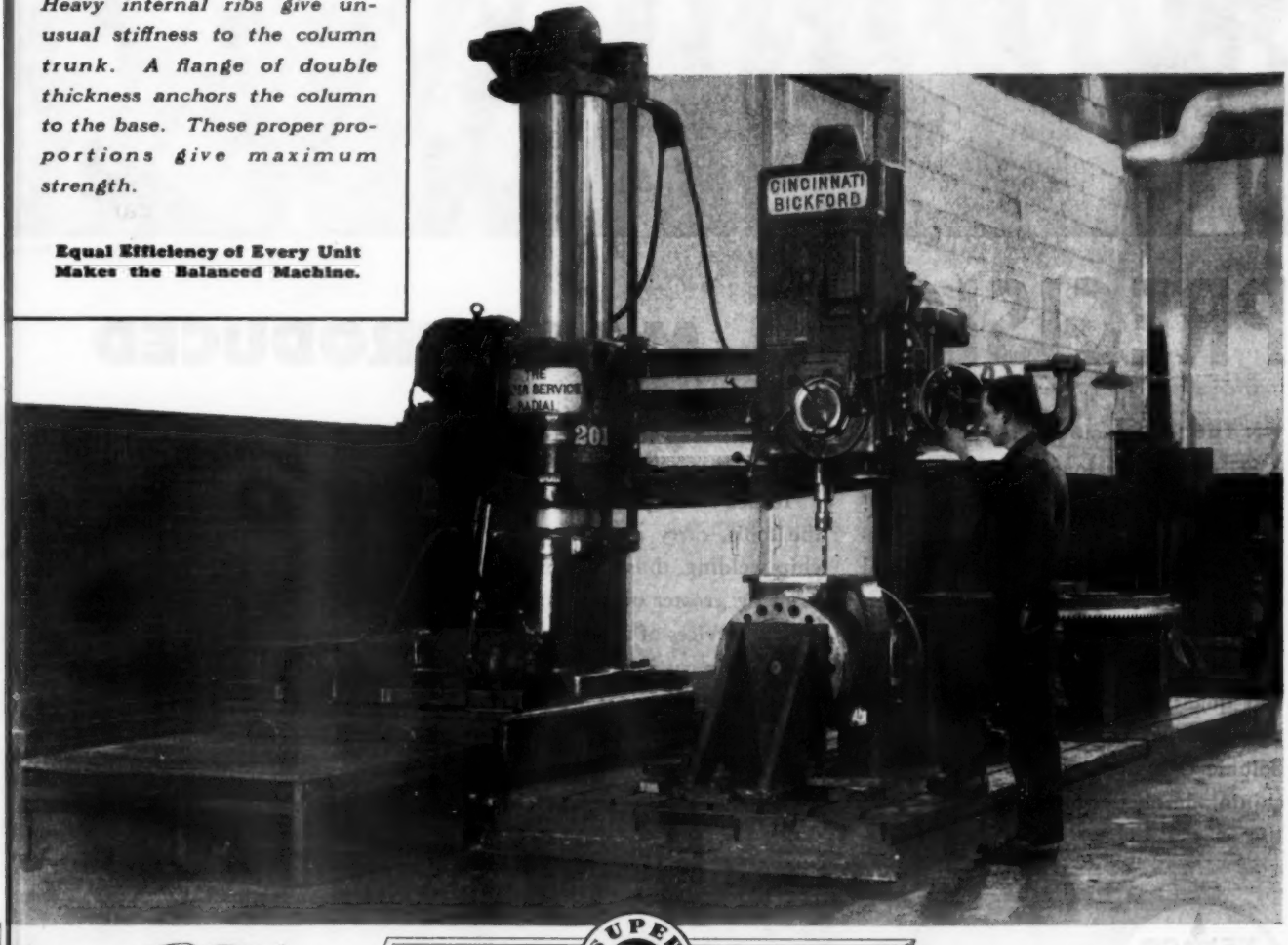
Equal Efficiency of Every Unit Makes the Balanced Machine.

The low physical effort required of the operator on this Super Service Radial Drill and the accessibility of its controls contribute much to a maximum output. The use of the sliding base and a helper to set up work while the drill is in operation, give practically continuous drilling. Freedom from trouble and easy handling are necessities on production jobs.

Write for Bulletin R-24-A



ARMY E NAVY

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THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio U.S.A.

Official U.S. Navy Photo

PRECISION...MASS PRODUCED

IN THE first 30 months of the war, the U. S. Navy alone fired more than 41,000 tons of projectiles at the enemy! Each of these projectiles — from machine-gun bullets to giant 16-inch shells — had to be finished to the most precise tolerances for safety and accuracy in firing.

Because ammunition is needed in such vast quantities, machining must be fast as well as accurate. Texaco Cutting and Soluble Oils not only assure faster machining, but better finish and longer tool life as well. That is why they are the choice of experienced machine tool operators everywhere.

Texaco cutting fluids cool and lubricate the tools, carry away heat and prevent chip welding, thus lengthening tool life, assuring greater output.

The services of a Texaco Engineer specializing in cutting coolants are available through more than 2300 Texaco distributing plants in the 48 States. Get in touch with the nearest one, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

RECONVERSION RUSTPROOFING

5 Points to Remember

1. Upon termination of war contracts, Government-owned production equipment must be rustproofed promptly, in accordance with *official instructions.*
2. Ordnance Specification P.S. 300-4 contains *official instructions* for the complete processing of such equipment.
3. These instructions require that only rustproofing materials meeting Government specifications be used.
4. *Texaco rustproofing products meet Ordnance specifications for application on Government-owned equipment.*
5. For full information, see your Texaco representative or write to us.

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TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON EVERY SUNDAY NIGHT — CBS

Notes on Reconversion

A SHREWD government official and economist recently observed that the government is faced by a three-fold problem in connection with reconversion.

It must remove the emergency war controls as rapidly as possible; it must be prepared to break bottlenecks, and still better to anticipate and prevent them, in the reconversion cycle; and it must establish and vigorously sponsor a program that will result in the highest possible total of employment.

It is much easier, of course, to spot the problem than to handle it successfully. The truth is that no slide rule can be used to figure out accurately exactly what will happen, because there are too many imponderables that must be considered.

When will V-E Day come? Since no mass surrender by Germany appears likely, V-E Day can't come any other way than by proclamation. Perhaps for the good of the country it might be well to adopt the suggestion that the President quietly announce on a Monday that he had just been informed by General Eisenhower that V-E Day had occurred the previous Tuesday!

How long will Japan last after the final bit of resistance in the Reich is wiped out? If Japan should surrender at once or within a short time, we would have an economic problem of colossal proportions to solve. We would be in an economic fix, to put it mildly—though all of us would gladly take on that problem to bring nearer the day of victory.

Prolonged fighting by Japan will mean a more gradual reconversion to civilian goods here at home, a more orderly process, but who knows what Japan may do?

The well-planned thing to do would be to bring back our men from the battle areas at a rate at which the country's business and industry can reabsorb them into jobs. But does anyone familiar with human nature think that the American people are going to be satisfied to have them released that way?

Fortunately our top military authorities know better. They realize that the clamor to bring the boys home will be so loud that every conceivable means must be used to demobilize them as rapidly as military requirements will permit. How will that affect reconversion?

With the arrival of V-E Day, we naturally think of the labor crisis as easing. The tough task, as cutbacks increase, will be to keep people employed. Yet at least one respected authority predicts that six months after Germany ceases to fight, a tight manpower situation will be with us again because of the rate of reabsorption of workers in civilian industries, plus the requirements of the Japanese war.

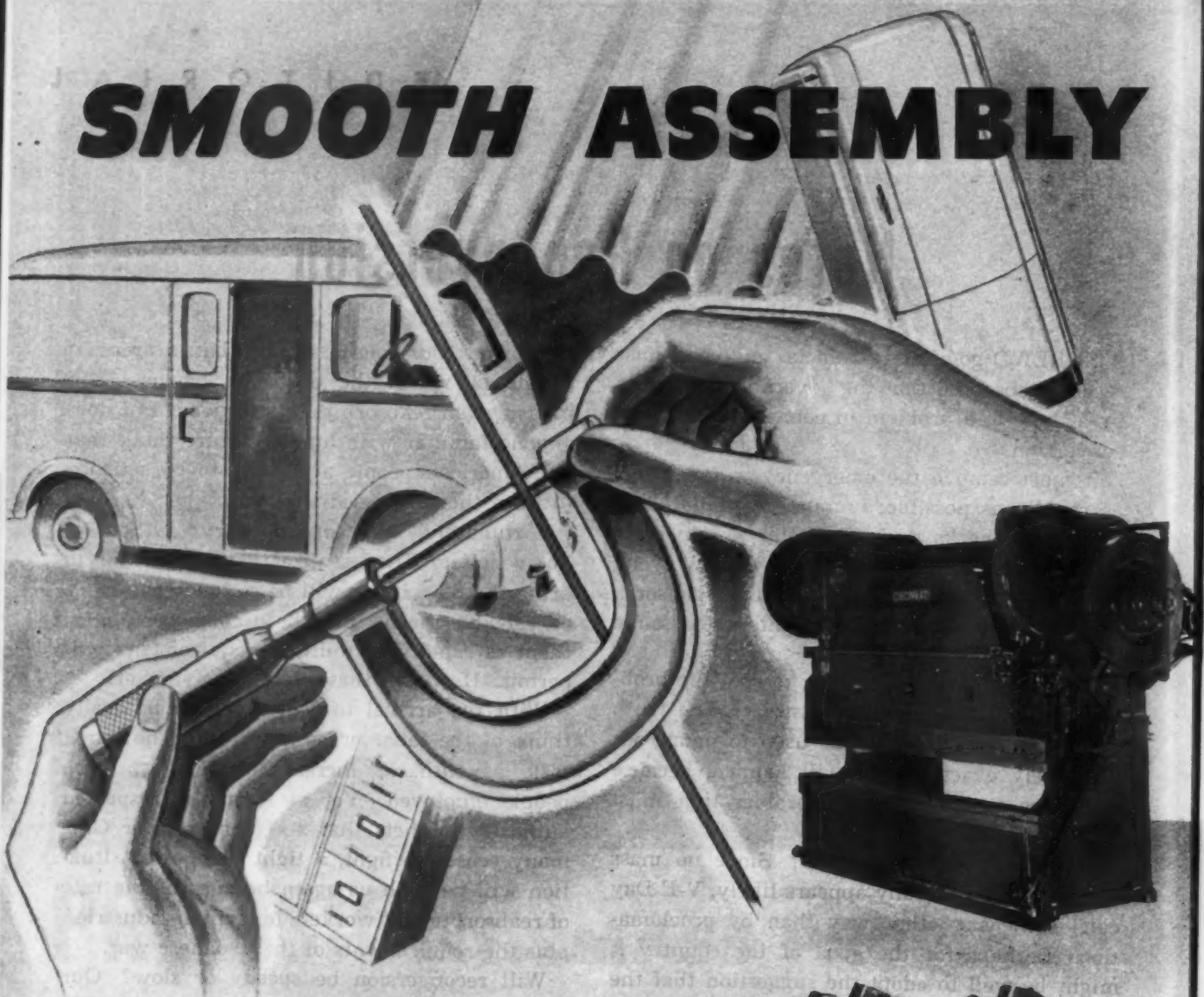
Will reconversion be speedy or slow? Our guess is that it will be faster than many people think, but who knows for sure? We can't find the answer until we have all the facts, and all the facts are not yet available.

All that we are trying to say is that the uncertain factors immediately ahead make it imperative that government agencies, entire industries, individual manufacturers and everyone holding a responsible position, public or private, must be on the alert from here on.

Plans must be kept flexible. Persons and organizations must be ready to move on an instant's notice. When the time comes for reconversion, we must not be sluggish. We must attack it with the same ardor and vigor with which we have gone at the task of winning the war.

Burnham Finney

SMOOTH ASSEMBLY



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Cincinnati Shears cut blanks square and accurately to size.

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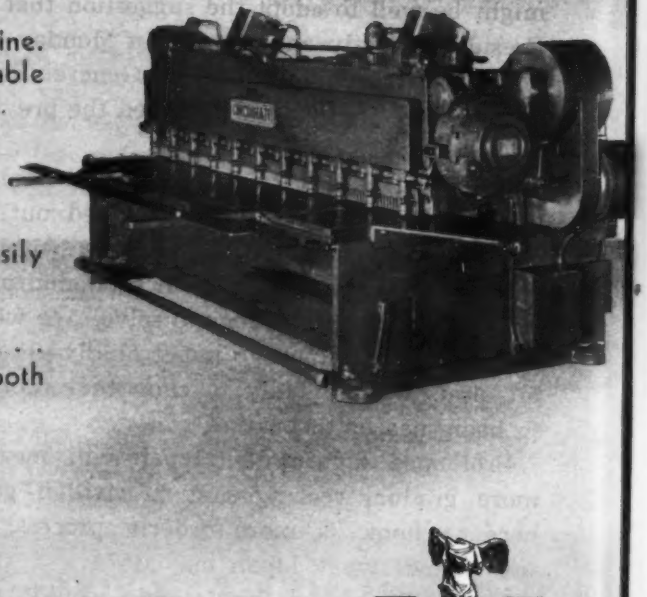
Whether it's trucks, cabinets, planes or refrigerators . . . Cincinnati shearing and Cincinnati forming will smooth your production.



Write for Shear Catalog S-4 and Press Brake Catalog B-2, which completely cover The Cincinnati Team of Shears and Brakes.

THE CINCINNATI SHAPER CO.

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SHAPERS · SHEARS · BRAKES

New Hiring Technique Needed When the Veteran Comes Home

BY DR. F. M. AMARAL, MEDICAL GENERAL SUPERVISOR
SAN DIEGO DIVISION, CONSOLIDATED VULTEE AIRCRAFT CORPORATION

An established program of placing workers in jobs for which they are suited fits into the Consolidated Vultee policy of employing handicapped veterans. All of 100 discharged servicemen interviewed in January were hired

THOUSANDS of wounded and disabled veterans now working in manufacturing plants throughout the nation are proof that industry is preparing itself for the important responsibility of placing returning soldiers in jobs they can do safely, thus helping them fit into society and return to normal ways of living. Many companies have instituted special programs to assure these men suitable jobs, despite their serious physical handicaps.

Although the hiring and placing of men injured in combat requires techniques not generally applied to other workers, Consolidated Vultee Aircraft Corporation utilizes a job placement program through which all employees are placed on the jobs they are best fitted for physically. This technique was originated to enable the company to hire physically handicapped men and women to relieve a manpower shortage. It is now proving highly successful in placing veterans in work they can perform efficiently.

Already, more than 1,000 World War II veterans have gone to work at Convair's San Diego division. In January alone, 100 discharged servicemen were interviewed for employment and the same 100 men were hired, a 100 percent average which represents a record in veteran interviews leading to eventual hiring. Many of the men were discharged because of severe injuries, combat fatigue, nervousness and other conditions. They are now working on jobs that will not aggravate physical conditions.

Convair's placement program functions through reg-

Tortured and beaten by the Japs, Lewis H. Fox is back in civilian life but still contributing to the war effort by installing instruments in planes which will pay back the enemy in good measure. He survived a Nazi prison camp, the Jap death march, a Jap prison, and was twice adrift in the sea and rescued by Filipino and Chinese guerillas. Both knees were broken by Jap beatings, but he has recovered and is performing his production assignment efficiently

ular company channels, rather than through a separate department. This system is particularly agreeable with veterans. They are assigned to jobs in the same manner as other employees. Unless an injured or disabled soldier tells his fellow workers that he is a veteran, they will not know it. Handicapped persons have been working at Convair for more than two years and employees are accustomed to working alongside someone who has an obvious physical handicap, such as an arm or leg replaced with an artificial limb. Thus veterans are accepted on the job as a routine procedure, as they wish to be, and placement is accomplished effectively with a minimum of attention centered on a handicapped veteran or other employee.

Foremen Administer Plan

Foremen and department heads administer the placement program while initial stages are operated through the employment and medical divisions. A medical department assistant coordinates placement matters through industrial relations and supervision.

The company's placement technique is based on the principle that the physical abilities of an employee must correspond with the physical requirements of a job. Experience of the company in hiring thousands of handicapped workers, including veterans, has shown that any man or woman—an older person, one who is handicapped, limited or in perfect physical condition—works more effectively when given the most arduous job he, as an individual, can perform safely and continuously.

Awarded the Purple Heart for wounds suffered in the Battle of Darwin, William Knapp returned to civilian life as a training specialist at Convair and is now a foreman in a Navy Liberator department where he is shown instructing two high school girls in cable installation. Knapp served five years as chief flight engineer in Patrol Wing 10, attached to the Asiatic Fleet

To determine an applicant's physical capabilities, a company physician examines each person at the time of employment. Results of the examination are coded briefly into a classification of general physical condition and modifications from the following chart:

CLASSIFICATION OF WORKER

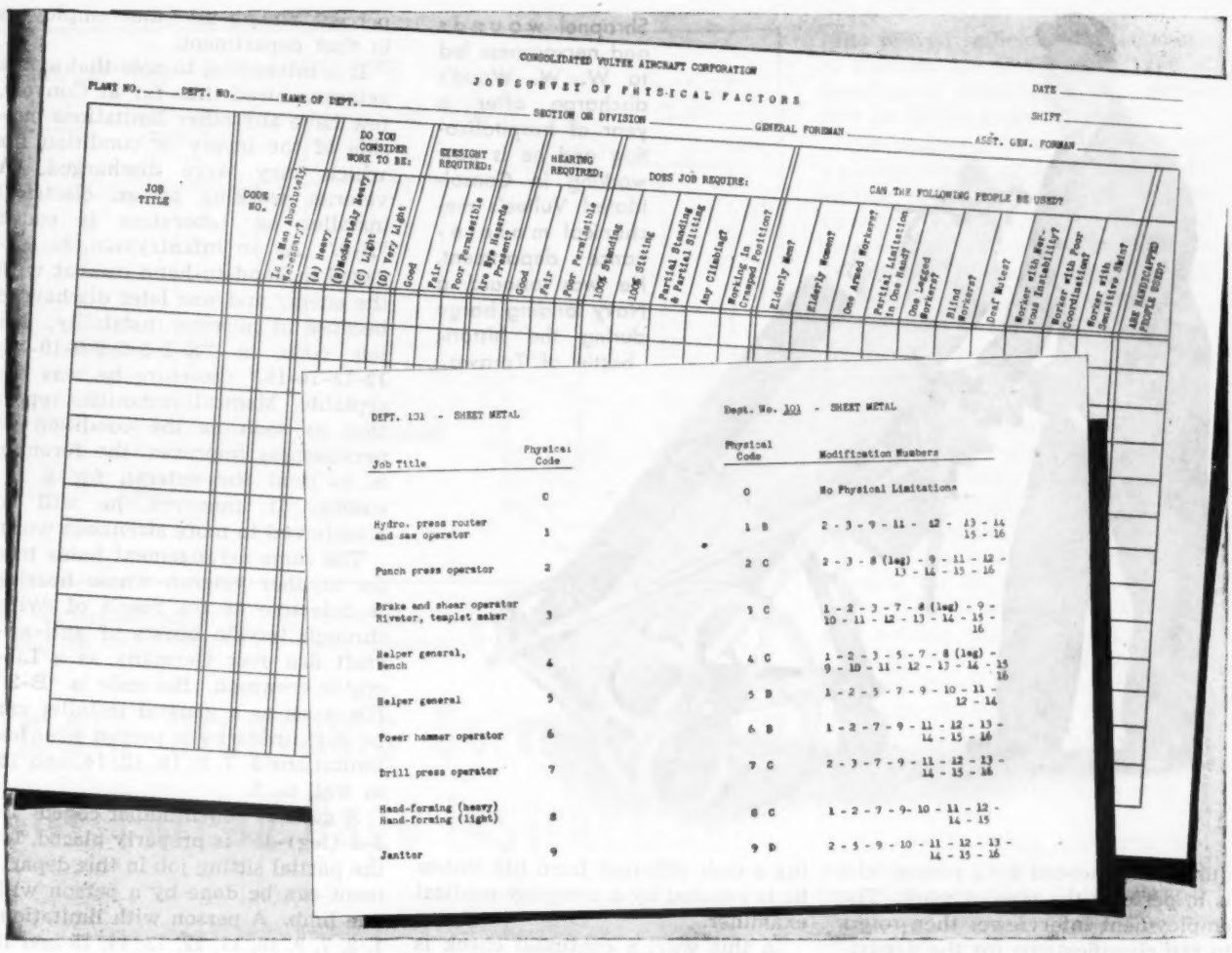
GENERAL

A. Capable of heavy sustained labor.
B. Capable of moderately heavy labor.
C. Capable of light labor.
D. Capable of very light labor.

MODIFICATION

1. Worker with monocular vision or severe visual defect. (Should not work where eye hazards are present.)
2. Worker with severe defect of hearing.
3. Worker who should have partial sitting.
4. Worker capable of sitting job only.
5. Worker with poor coordination.
6. Worker with nervous instability.
7. Worker with sensitive skin.
8. Worker with one limb (amputation) or complete limitation.

Leaving his Convair job to become a tail gunner, Lyle Drager, who completed 51 missions over Germany and was awarded the Air Medal and six Oak Leaf Clusters, is now back at work as a final assembler on big Navy planes. Honorably discharged because of a leg injury and operational fatigue, Drager has readjusted himself to production work



CONSOLIDATED VULTEE AIRCRAFT CORPORATION

JOB SURVEY OF PHYSICAL FACTORS

PLANT NO. _____ DEPT. NO. _____ NAME OF DEPT. _____ SECTION OR DIVISION _____ GENERAL FOREMAN _____ ASST. GEN. FOREMAN _____ DATE _____ SHIFT _____

JOB TITLE	CODE NO.	DO YOU CONSIDER WORK TO BE: Is a Man Absolutely Necessary?	(A) Heavy	(B) Moderately Heavy	(C) Light	(D) Very Light	EYESIGHT REQUIRED: Good	Fair	Poor Permissible	Are Eye Hazards Present?	HEARING REQUIRED: Good	Fair	Poor Permissible	DOES JOB REQUIRE: 100% Standing	100% Sitting	Partial Standing & Partial Sitting	Any Climbing?	Working in Cramped Positions?	CAN THE FOLLOWING PEOPLE BE USED? Elderly Men?	Elderly Women?	One Armed Workers?	Partial Limitation in One Hand?	One Legged Workers?	Blind Workers?	Deaf Mutes?	Worker with Nervous Instability?	Worker with Poor Coordination?	Worker with Sensitive Skin?	ARE HANDICAPPED PEOPLE USED?

DEPT. 101 - SHEET METAL

Job Title	Physical Code
	0
Hydro. press router and saw operator	1
Punch press operator	2
Brake and shear operator Riveter, templet maker	3
Helper general, Bench	4
Helper general	5
Power hammer operator	6
Drill press operator	7
Hand-forming (heavy) Hand-forming (light)	8
Janitor	9

Dept. No. 101 - SHEET METAL

Physical Code	Modification Numbers
0	No Physical Limitations
1 B	2 - 3 - 9 - 11 - 12 - 13 - 14 15 - 16
2 C	2 - 3 - 8 (leg) - 9 - 11 - 12 - 13 - 14 - 15 - 16
3 C	1 - 2 - 3 - 7 - 8 (leg) - 9 - 10 - 11 - 12 - 13 - 14 - 15 - 16
4 C	1 - 2 - 3 - 5 - 7 - 8 (leg) - 9 - 10 - 11 - 12 - 13 - 14 - 15 16
5 B	1 - 2 - 5 - 7 - 9 - 10 - 11 - 12 - 14
6 B	1 - 2 - 7 - 9 - 11 - 12 - 13 - 14 - 15 - 16
7 C	2 - 3 - 7 - 9 - 11 - 12 - 13 - 14 - 15 - 16
8 C	1 - 2 - 7 - 9- 10 - 11 - 12 - 14 - 15
9 D	2 - 5 - 9 - 10 - 11 - 12 - 13 - 14 - 15 - 16

Survey sheet used by foremen and medical department assistant in evaluating jobs within departments to determine physical requirements an employee must have to perform various jobs. Sample sheet from physical coding book used by employment interviewer and foremen to show how jobs are evaluated to correspond with physical abilities of employees at Convair

9. Worker with hernia or tendency toward developing hernia. (Relaxed rings, large abdominal scars.)
10. Worker unsuitable for work around dangerous machinery.
11. Worker with history of back strain or injury.
12. Worker with chronic illness (heart trouble, kidney trouble, etc.)
13. Worker with aphrasix characteristics. (Senile)
14. Worker with arrested tuberculosis, asthma, or chronic bronchitis.
15. Workers unsuitable for climbing (by reason of age, weight, or other factors).
16. Worker with partial hand or arm limitation.
17. Industrially blind.
18. Blind.

Every job in the plant is analyzed and those which can be filled by physically handicapped workers are coded so the employment department can tell what kind or kinds of disabilities an employee can have and still perform his designated assignment.

Take the case of a veteran who was discharged because of a compound fracture in the right elbow and still is partially handicapped. His code as listed in the classification chart is "B-15-16," which indicates that he is capable of doing moderately heavy labor, but is unsuitable for climbing and has a partial hand or arm limitation. He works as a painter at Convair, a job which has a code of "B-2-9-10-11-12-13-14-15-16." The two codes do not conflict. A man coded B-15-16 is therefore acceptable. If the veteran had been found to have a condition of nervous instability as well as other injury, he would not have been placed in this job because the modification "6" is not listed in the job code. Some job code including "6" would have to be found and here again every effort would be made to assign the worker to the most rigorous job in his particular classification.

All Jobs Are Coded

All jobs in departments throughout the plant are coded as to physical demands that will be required of a worker. In coding the jobs, a medical department assistant discussed with the departmental foremen the job evaluations involved in their departments. Jobs were coded and listed in a book of classifications. Employment assistants use the book as a guide in interviewing applicants, while foremen use it in placing newly hired employees, transferring workers, and on other work changes that arise.

When sending in a requisition to the employment office for workers, a foreman lists opening for the number of "Job 1's" or "Job 2's," etc., he needs, indicating the physical re-

Shrapnel wounds and nervousness led to W. W. Wood's discharge after a year of hospitalization and he is now working in Consolidated Vultee's mechanical maintenance department. He was aboard a Navy landing barge during the historic battle of Tarawa

quirements needed by a person who is to perform the type of work. The employment interviewer then refers to the classifications for the department concerned. Codes are listed for each job and judicious questioning on the part of an interviewer brings out to 98 percent accuracy, the answers necessary to hiring the prospect for a certain job.

The employee goes to the medical division for a pre-placement examination and is assigned his code. A record of each employee's medical history is kept in a confidential file by the medical division, while only the code appears on the employee record sheets. On the foreman's copy of such sheets, the word "Limited" is stamped in large letters, if the worker is limited by any of the modifications listed on the physical coding chart. By referring to his job classification book, in which the chart appears, the foreman can readily ascertain what limitations the employee has.

Transfers Are Controlled

Thereafter, the foreman cannot transfer an employee to any other job that is easier or harder than the class for that particular department, unless the employee requests a recoding. Nor can the employee request a transfer to another job having a code different from his, unless he is recoded by a company medical examiner.

In this way, a continual check is maintained on the physical capacity of a given individual in relation to the physical requirements of the job he is performing.

Program Highly Flexible

Medical advice on placement is not a dictated policy that must be accepted without question. The program is highly flexible. Employees and foremen may object to classifications at any time and request re-examinations and re-codings. In 1944, more than 18,500 physical examinations were conducted at the San Diego division employment office. Approximately 10,000 persons in the group were found to have limitations and of those placed on jobs, only 275 had to be re-classified during the year.

In productivity, Convair has found that the records of physically handicapped employees equal those of the more physically fit workers. But in absentee rates, they have a far better showing. For example, one department's attendance report revealed an absentee rate of 4 percent among employees with limitations such as one arm, one eye, hernias, one leg and over-age, as opposed to an absentee rate of 9.5 percent among all other employees in that department.

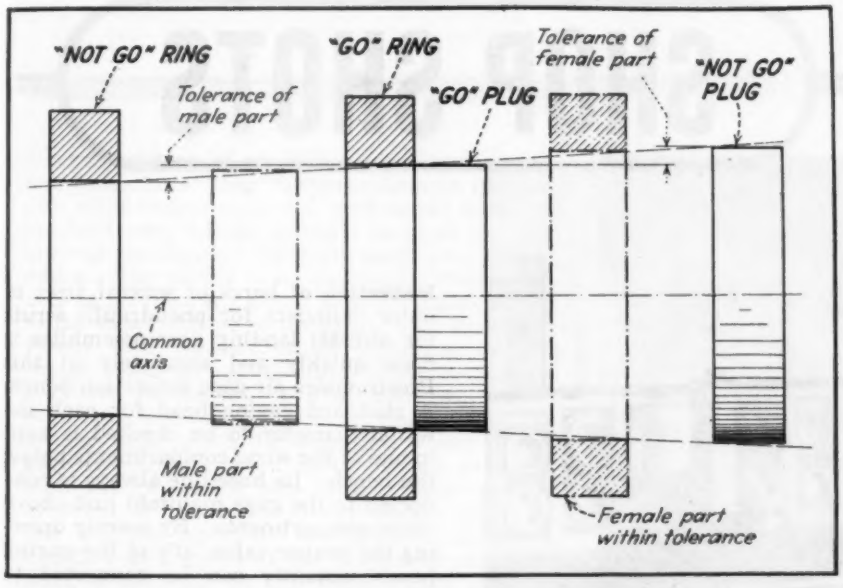
It is interesting to note that of the veterans hired thus far at Convair, few have any other limitations outside of the injury or condition for which they were discharged. A veteran working as an electrical installer on Liberators is coded "B-6." As an infantryman, he engaged in hand-to-hand combat with the enemy and was later discharged because of nervous instability. His job code is "X-2-3-5-6-9-10-11-12-13-14-16," therefore he was acceptable. Medical authorities report that as soon as the condition of nervousness improves, the foreman is to send the veteran for a recoding. If improved, he will be transferred to more strenuous work.

The same arrangement holds true for another veteran whose hearing is defective as the result of flying through terrific bursts of anti-aircraft fire over Germany as a Liberator crewman. His code is "B-2." His work as a general installer can be performed by a person who has limitations 3, 7, 9, 10, 12, 14, and 16, as well as 2.

A general bench helper coded "C-3-8 (leg)-15" is properly placed, for the partial sitting job in this department can be done by a person with one limb. A person with limitations 1, 2, 7, 9, 10, 11, 12, 13, 14, 15 and 16 can also do this same type of work.

Thus, wounded veterans are placed on jobs in accordance with their particular limitations in the same way that other employees are handled, since Convair's program is intended to find a job for any person with any given limitation. As administrators of the placement technique, foremen handle special cases that arise with veterans, concerning emotional and environmental factors, with assistance from the medical department assistant. Although many veterans require a certain period of time to re-adjust their emotional lives, proper placement on jobs and supervision of a foreman who handles placement problems, help the men become adjusted to society rapidly.

Furthermore, the placement program has been worked out so that the handicapped workers do not feel limited in the jobs to which they have been assigned. They are encouraged to exercise initiative and are advised to consult with the foremen and department heads if they feel they would be better suited to another type of work which their condition would permit them to perform in a satisfactory manner.



The relation of gages to each other and to gaged parts is shown in the diagram and illustrates the basic operation of all plug and ring gages

Simple Diagrams Solve Problem Of Thread Gage Instruction

BY MONTGOMERY SCHUYLER
Gage Inspector, Hub Industries

Visual program gave inspectors a clearer mental picture of the relationship and operation of gages used in checking parts

COMPETENT INSPECTION of precision threaded parts represents an essential function. An extensive training program was established at the Hub Industries plant, but it became apparent that many of the trained inspectors did not have a complete knowledge of the function and relationship of female thread gages and the corresponding male gages.

Investigation indicated that verbal explanations given during training had not made a lasting impression. It appeared that many inspectors did not have a clear mental picture of an actual gage and its relationship to the part it was to pass or reject.

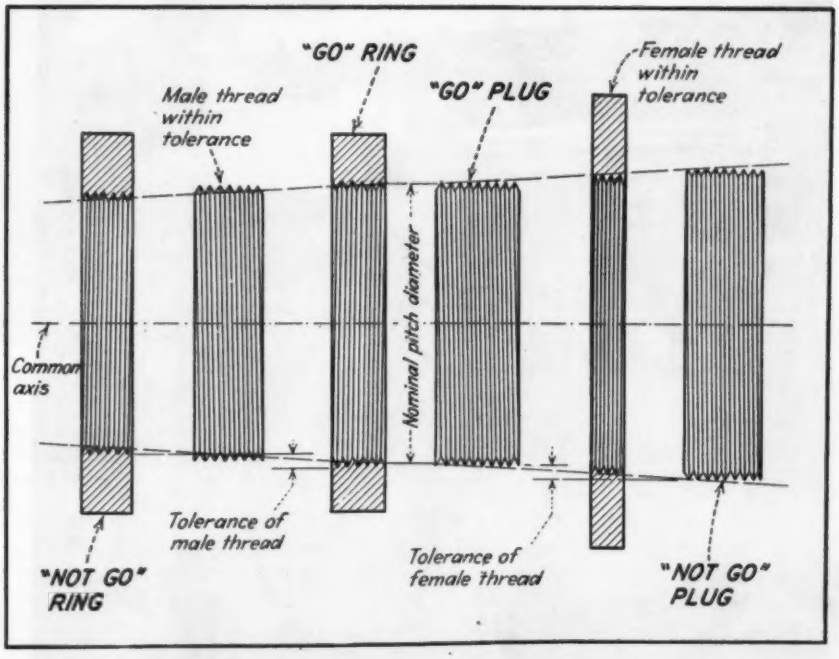
Those studying the problem became convinced that a visual presentation of the basic facts about gages would tell the story.

It was decided to employ the simple application of a set of plug and ring gages. Tests were made on various employees, and the results proved sufficiently satisfactory to warrant use of the same type of sketches in illustrating the operation of thread gages.

The diagrams paved the way for a clearer understanding of gage operation and consequently stepped up the inspection efficiency of the men and women engaged in ascertaining the accuracy of the precision threaded parts manufactured.

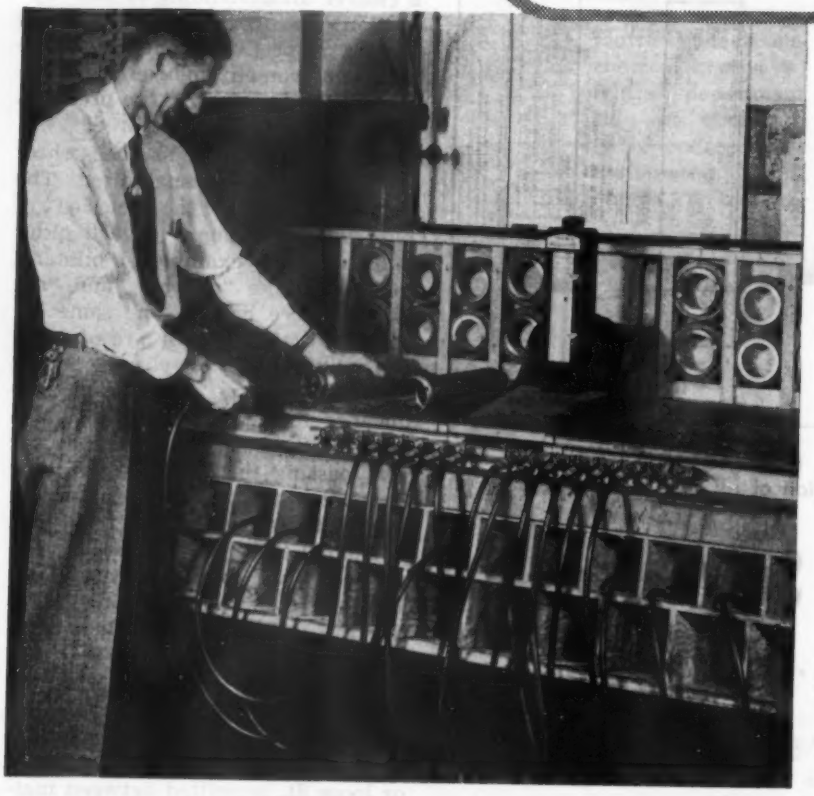
The accompanying sketches show the diagrammatic visuals used. The diagram showing the relation of plug and ring gages to each other is also a good example of bilateral tolerance. The "go" ring and "not go" plug are both of the same diameter. Although they are of identical dimensions, they will not fit together because there is no allowance for fit. This will serve to prove to the most skeptical that any part passing the "go" plug will be larger than the "go" plug dimension; any part passing the "go" ring will be smaller than the "go" ring dimension; they will therefore fit together. The "go" ring and "go" plug establish the fact that the parts will fit when assembled.

The "not go" ring gage and "not go" plug gage establish the manufacturing tolerance. This tolerance determines the amount of clearance, or loose fit, permitted between mating parts. Any mating parts that pass both "go" and "not go" gage inspection will fit together and be within the allowance permitted for loose fit.

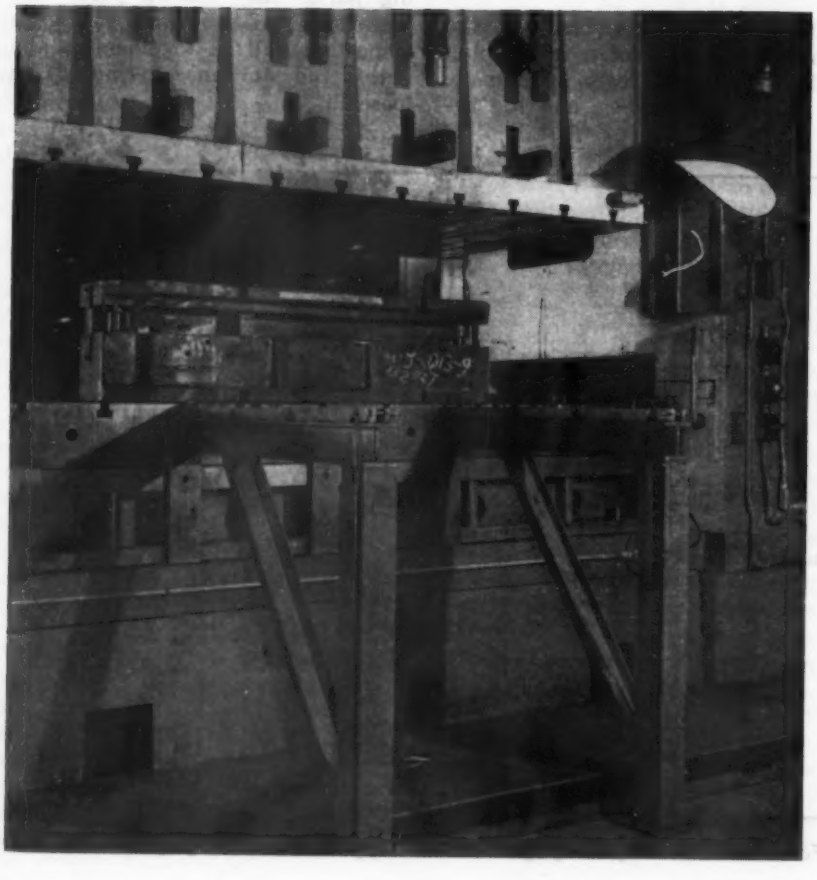


Facts shown in the plain gage sketch are applied to thread gages in this view

SHOP SHOTS



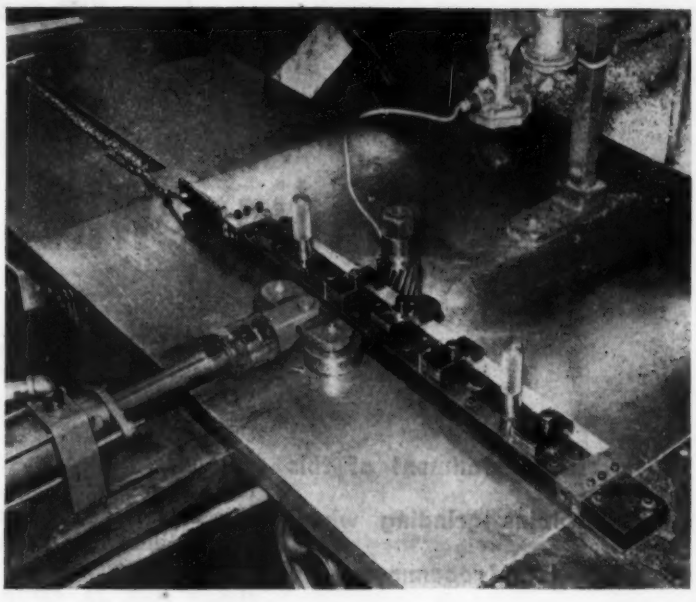
Inspection of bores of several sizes of outer cylinders for pneudraulic struts for aircraft landing gear assemblies is done quickly and accurately at this Precisionaire air gage inspection bench. A standard gaging head for each internal diameter to be checked is kept in one of the wood compartments below the bench. Its hose line always is connected to the gage manifold just above these compartments. By merely opening the proper valve, any of the gaging heads instantly can be connected to the gage unit. An important feature is the mounting of master "go" and "not-go" ring gages in pairs, one above the other, in a rack at the rear of the inspection bench. It is a simple matter to insert the gaging heads into these master ring gages, in order to set the pointers on the gaging units, and then proceed with the inspection of one or more cylinders. Time is saved because it takes only a fraction of a minute to get ready to check a job; all points in the bore of a given cylinder can be checked in a short time. *Winters & Crampton Corporation.*

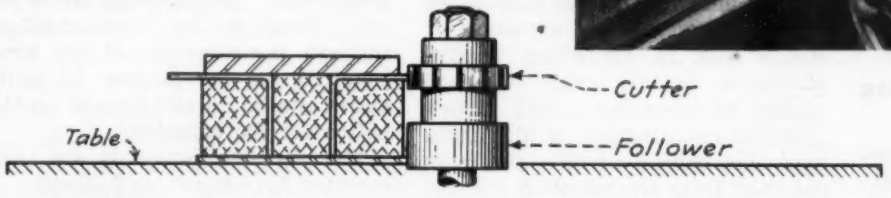


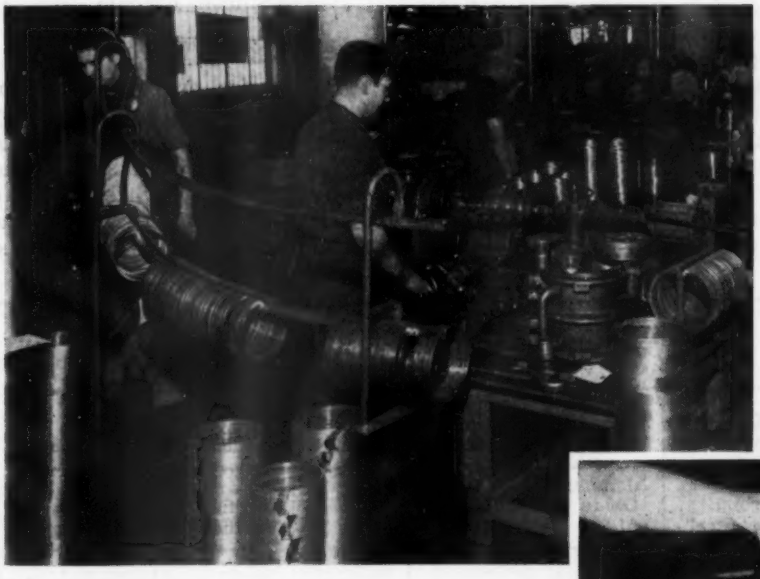
Rails which extend from the bed of a large forming press have reduced the time required to locate dies approximately a tenth of that previously required. Gang rollers between the rails are made of steel wheels ⅝ in. wide and 2¼ in. in diameter. They are spaced four inches apart between 1 in. wide steel plates. They work in channel tracks built on heavy H-beam cross members which are bolted to the press on one end and extend out nearly 4 ft. to H-beam uprights.

Dies used on the press weigh from one to five tons. A carloader can put a die on the rails at the press bed level. Then one man can move the die into place by pushing it along the traveling gang rollers which move from the channels into slots in the bed. When the die is positioned it is lifted by the pins through the bed and the rollers can be slipped back out into the channels with ease. Rails can be set two, four or six feet apart depending upon the size of the die which is to be used. The only maintenance necessary on the roller rails is an occasional cleaning and lubrication with light weight grease. Joseph Churton, *Consolidated Vultee Corporation.*

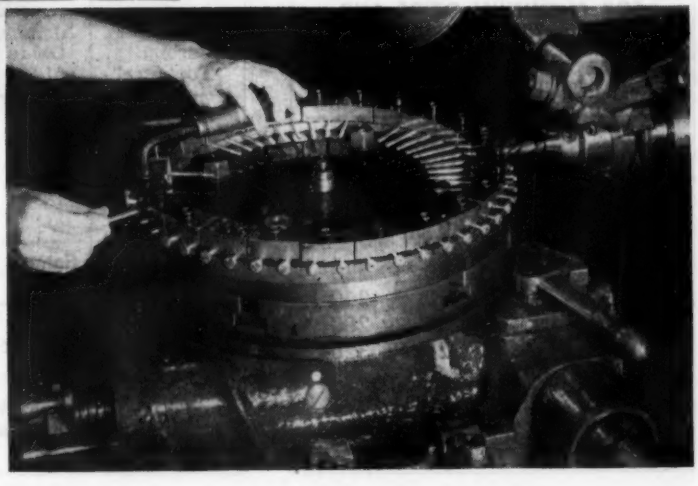
Irregular edges of aircraft parts are trimmed five times faster than formerly through the use of a wood shaper equipped with power feed. A motor-driven spindle projects through the flat table of the shaper. On it are mounted a cutter and a collar of the same diameter. The collar acts as a follower against a shaper block made to the exact outline of the parts to be trimmed. Power feed consists of an extension to the shaper table; an endless roller chain, located in a groove in the top of this extension, passes over sprockets at each end of the groove. It returns underneath the extension where it engages a variable speed unit. An air cylinder with rollers on the end of the piston rod is mounted at the front of the shaper table in line with the spindle. A chain and hook are attached to the end of the shaper block. The hook is fastened to the roller chain to pull the block past the spindle while the air cylinder holds the block against it at the proper pressure. *Goodyear Aircraft Corporation.*







Piston rings for aircraft engines are made from individual ring castings of special alloy iron. After these rings have been faced by grinding, they are split and then rough and finish turned and bored in groups with carbide-tipped tools. To facilitate moving these split rings between operations, special angle-iron slides have been developed. The angle sections are inverted, and are supported from straps welded to the point of the V-section, as indicated. These units are used in various lengths throughout the shop, both to deliver the rings from one operation to the next, and to support the rings without damage to the machined surfaces. *McQuay-Norris Manufacturing Company.*



A multiple rotary chuck to permit a continuous feed has brought about a 450 percent production increase in a single bolt-milling operation. The method enables the operator to remove the finished bolts and insert new ones without interruption to the feed. Not only has this reduced man-hours, but in addition has released vital machine time for other important work. Previously a standard chuck was used and this necessitated loosening three studs to insert and remove each bolt for the milling operation. *Glenn L. Martin Company.*

Grinding Wheel Selection

BY M. MARTELLOTTI, RESEARCH ENGINEER, CINCINNATI MILLING MACHINE CO.

The twelfth installment of this series explains grinding wheel designations and recommends the types best for cutter sharpening

IN ORDER TO OBTAIN satisfactory results in grinding milling cutters, the properties of grinding abrasives and the correct shapes of wheels should be understood. The selection of a proper wheel is aided by familiarity with the standard designations compiled by the Grinding Wheel Manufacturers Association. The user should realize, however, that variations in wheel properties will exist in the products of different manufacturers despite standard designations and be guided by his own experience with specific makes of wheels. Most grinding wheels are made from artificial abrasives, known as aluminum oxide (chemical formula Al_2O_3) and silicon carbide (chemical formula SiC), although a limited percentage is made from natural abrasives or stones such as corundum (native aluminum oxide), emery (a hard variety of corundum), and garnet.

In the manufacture of aluminum oxide and silicon carbide, the mass obtained from treatment of the various elements at high temperature is crushed in machinery of various types and finally reduced by ball milling to a finer particle or grain.

These grains are then graded by screening (sifting through screens having various numbers of openings per linear inch). The size of abrasive grains thus separated is approximately the number of openings per linear inch, in Table 9.

The 40-grain size, for example, is a grain which will pass through a screen having 40 openings to the linear inch. The gradings above 200 are classified by sedimentation, through measurement of the time required for the powder to settle out of the liquid and deposit on the bottom of the container.

The abrasive materials are represented by letters*, as follows:

A—Aluminum oxide
C—Silicon carbide

Wheel Bonding Materials

A given size or combination of sizes of grains is bonded together by mixing with various materials and formed to the desired shapes and sizes of grinding wheels. In a majority of grinding wheels, the grains are bonded by a vitrified

TABLE 9—STANDARD GRAIN SIZES FOR ALUMINUM OXIDE AND SILICON CARBIDE

GRINDING WHEELS			
Coarse	Medium	Fine	Very Fine
10	30		
12	36	70	
14		80	220
16	46	90	240
20		100	280
24	54	120	320
	60	150	400
		180	500
			600

TABLE 10—SPECIFICATIONS OF GRINDING WHEEL FOR GRINDING MILLING CUTTERS

Cutter Material	Abrasic Material	Grain Size	Grade	Bond	Operation
Carbon Tool Steel	Aluminum Oxide (Al_2O_3)	46-60 100	K H	Vitrified Vitrified	Roughing Finishing
H-S Steel: 18-4-1 18-4-2	Same	60 100 80 100	K, H H F, G, H H	Same	Roughing Finishing Roughing Finishing
Cast Tool Material	Same	46 100-120	H,K,L,N H	Same	Roughing Finishing
Sintered Carbide	Silicon Carbide (SiC)	60	G	Same	Roughing After re-brazing
	Diamond Diamond	100 Up to 500	— —	Resinoid Same	Roughing Finishing

process in which a ceramic clay is used as the bonding material. By varying the percentages of the elements composing the mixture, it is possible to vary the physical properties of the grinding wheel, such as its strength and resistance to disintegration.

There are also silicate bonded wheels where the bonding agent is a silicate of soda which imparts to the grinding wheel a milder cutting action than is produced by the vitrified bond. Resisoid, shellac and rubber bonded wheels are also used. Grinding Wheel Manufacturers designation of a bond process is represented by the following letters:

V—Vitrified
S—Silicate
E—Shellac or elastic
R—Rubber
B—Resinoid (Synthetic resins such as Bakelite, etc.)
O—Oxychloride

The hardness or grade of grinding wheels is the resistance of the grain to breaking loose from the bonding material. It is indicated by a letter of the alphabet with A at the soft end of the scale and Z at the hard end. Middle alphabet letters from K to Q designate medium grades.

Marking of Grinding Wheels

The methods of marking grinding wheels change in relation to the type of bond, the grain size, the type of wheel, method of manufacture and uses. The markings adopted by the Grinding Wheel Manufacturers Association consist of six parts placed in the following sequence:

(1) Abrasive, (2) Grain Size, (3) Hardness or Grade, (4) Structure, (5) Bond or Process, (6) Manufacturer's Record.

The markings placed in proper sequence will be shown on the grinding wheel as follows:

A — 36 — L — 5 — V — 93

Simpler markings however, are used for tool grinding wheels.

The shapes of grinding wheels most commonly used in grinding milling cutters are shown in Fig. 69. These wheels are made of an abrasive material of aluminum oxide (Al_2O_3) by the vitrified process. The specifications are given in Table 10 for grinding different types of milling cutters made of carbon tool steel, high-speed steel, cast tool material and sintered carbide.

Diamond wheels are used in

**Grinding Wheel Manufacturers Association Standard.*

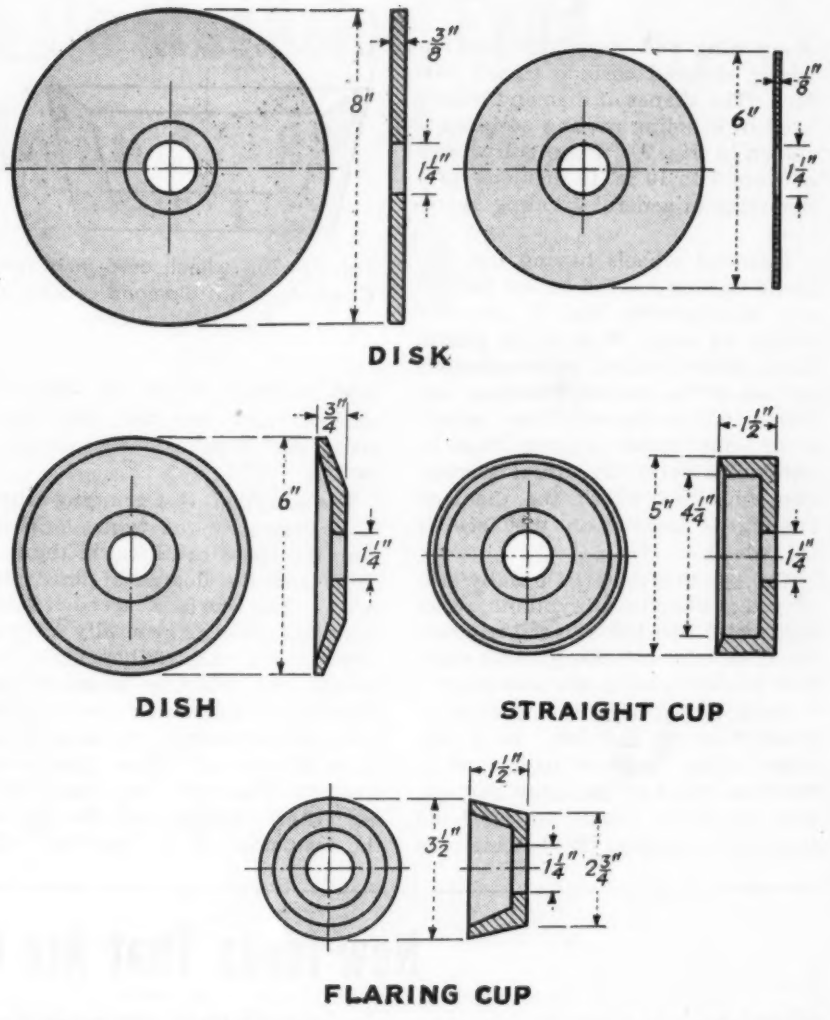


Fig. 69—These are the shapes of grinding wheels most commonly used in grinding milling cutters

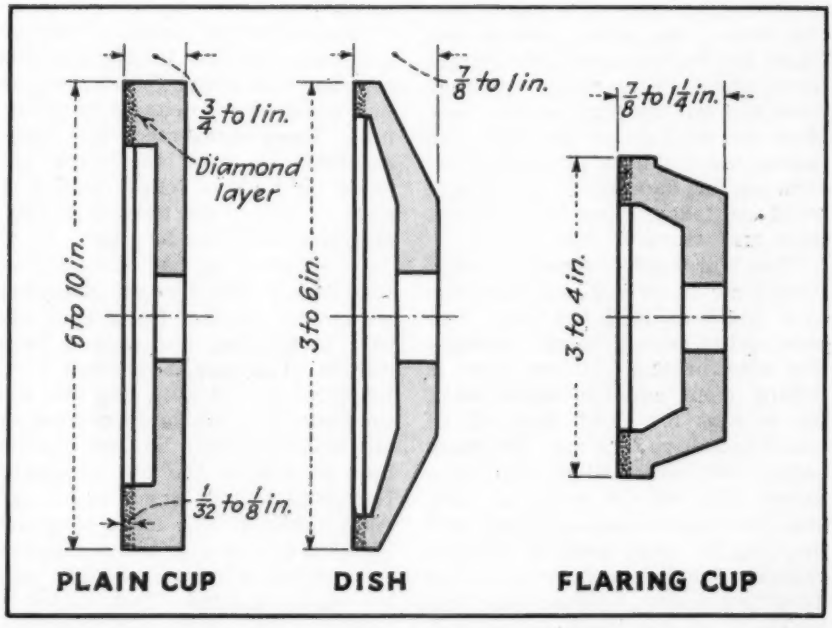


Fig. 70—Diamond wheels, having resinoid or metal bonding, are most commonly used in these shapes for cutter grinding. Although plain cup wheels are commonly used in sizes from 3 to 10 in. in diameter, even larger wheels are proving economical in use

sharpening and especially fine finishing sintered carbide tipped cutters. The shapes of diamond wheels used in grinding milling cutters are shown in Fig. 70. Plain cup wheels of from 3 to 10 in. in diameter predominate in general grinding operations.

Diamond wheels having the diamond coating located on the periphery, as shown in Fig. 71, are preferred by some West Coast plants. These wheels offer a more economical use of the diamond coating, less waste when dressing the wheel, freer and cooler cutting than is obtainable with the usual flaring-cup wheel in which the diamond coating is located on the face of the wheel.

The bonding material usually employed is Bakelite or synthetic resin, but metal bonded wheels, a product of powder metallurgy, and vitrified bonded wheels are also used.

Diamond concentration is of three grades—25, 50 and 100. In a diamond wheel marked 100-B 100-⅛ the first number indicates the grit size, the letter stands for the bond type (B — resinoid; M — metal), the next number shown the diamond concentration, and the final figure gives the depth of the diamond section.

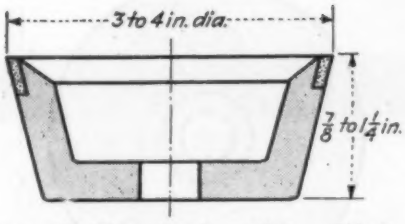


Fig. 71—This wheel, used in a West Coast shop, has diamond coating on the periphery only

The selection of a grinding wheel is governed by the type of operation, the speed available in the machine and the degree of finish desired. The surface speed of the grinding wheel is generally 4,500 to 5,500 ft. per min. Whenever practicable, the grinding wheel should rotate in a direction so as to press the sintered carbide tip against the body of the tool rather than away from it. This will cause the grinding wheel to approach the tip on the face side. It will prevent flaking of the tip, produce a clean cutting edge, and it will result in cooler grinding action than if the wheel is run in the opposite direction. Diamond wheels are made in grit sizes from 80 to 500, and classified as follows:

Coarse	80 to 150 grit
Medium	180 to 240 grit
Fine	320 to 500 grit

Within this range, it is comparatively easy to rough grind for stock removal with a coarse grit wheel, to obtain an excellent cutting edge with a medium grit wheel and to produce a keen edge and a mirror finish with a fine grit wheel.

The face of a diamond wheel should be dressed only after the conditions under which the wheel is operating cause glazing to develop, or cutting action becomes subnormal. Tools that have been correctly ground with diamond wheels of 220 grit or finer will show from two to three times greater life between grinds than tools finished by other means.

This article concludes Mr. Martellotti's series on milling cutters.

New Ideas That Are Old

BY JOHN R. GODFREY

"I'M WONDERING" said old man Johnson the other day, "how much time and money we waste because we forget the way we used to do things? Even when we make a record of them and put them in our file, how often do we look at the file? I'm betting most of us have stuff in our drawing, or data files, that would be of use today, if we knew it was there and where it was.

"You probably wonder what started me off on this task, Godfrey, so I might as well tell you. I've been sort of pepped up on this negative rake milling that everyone is talking about, and I've read a lot of the reasons for climb feed, all of which sounds good to me. We know cutters last longer when they get a decent bite on the work as they enter instead of scraping along until they dig in. And most of us have probably tried it with more or less disastrous results, because there was backlash in the feed screw nut. You remember how the darn cutter would climb on top of the work, sometimes spring the arbor if a tooth didn't let go. That's why I like the term 'climb cutting'—they sure did climb.

"But it's only a comparatively few years ago that the milling machine men began to design feed screw nuts that could be run without backlashing. These prevented the cutter climbing all over the work and made 'in feed' or 'climb feed' possible. Some of the twist drill makers have used this for years.

"If some of us had known what was in our own files, or drawings, we'd have saved a lot of time and cold cash. Not long ago a large machine tool builder received a letter from an old guy who had dug up some interesting dope from an old article written in 1895 by the boss of one of the old companies they had bought some years ago. As a result of this letter they dug up some old catalogs and sent photostats to the aforesaid old guy with the inquiring mind. This catalog issued in 1900 mentioned that feed screws had compensating nuts. They also photostated the nut itself, from an old drawing.

"Digging back further they found an article written by the same boss of the old company in 1895. In this article he said he had built a milling machine in 1872 with a compensating nut on the feed screw so he could *'mill with the cut.'*

"One funny thing about this is that the new concern had been designing compensating nuts for their later machines when there had been drawings in their file of a similar device ever since they took over the old concern. No one had ever looked over the old drawings, or if they had, did not recall them in any detail or appreciate their significance.

"There's a chance for some one to devise a system that will tell us what's in our files. It's a real job, for it isn't easy. Card indexes seldom tell all you want to know, even when you write them yourself. But the main trouble is that we too often try to let a boy do a man's job. Only one who is thoroughly posted should look over any sort of index and filing system because they are the only ones who will know and appreciate what they mean."

Adjustable Magazine Feed Developed for Screw Machines

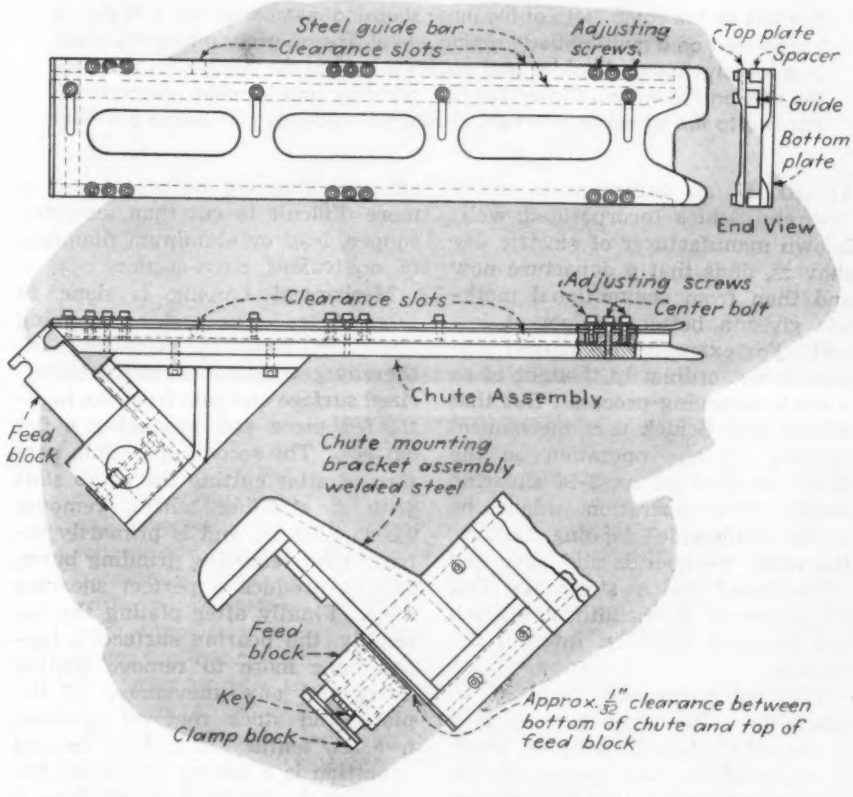
BY HARRY L. GIWOSKY, ASSISTANT SUPERINTENDENT OF TOOLING
WICHITA DIVISION, BOEING AIRPLANE COMPANY

SECOND-OPERATION WORK on automatic screw machines is done most economically when the parts can be fed automatically to the spindle collet chuck. Normally, this involves the development of a special magazine feed device for each part. In the manufacture of the Boeing B-29 bomber, it is necessary to make a number of cylindrical parts ranging in length from about 1¼ to 2½ in. These parts are of two diameters. One group is about 0.400 in. diameter and the other about 0.465 in. diameter. The quantities involved did not justify the construction of a separate magazine feed for each combination of diameter and length, so Boeing-Wichita tool engineers have developed the adjustable magazine feed unit shown for mounting on a No. 2-G Brown & Sharpe automatic screw machine.

This unit incorporates a chute with adjustable guides that is bolted to a welded steel bracket arranged for mounting on the screw machine. It is positioned so that the lower end of the chute is 1/32 in. above a feed block clamped to the front cross-slide of the machine. This feed block is slotted on the top and bottom faces with work-holding grooves and keyways. The work slot on one side is dimensioned to receive 0.400 in. diameter workpieces and on the other side the larger 0.465 in. diameter pieces. This feed block, when retracted by the cross-slide, is aligned to bring the work slot directly under the lower end of the chute so a workpiece can drop into it. Forward movement of the cross-slide positions this piece in front of the spindle and a rod pushes the piece into the collet chuck. The feed block is reversed on the cross-slide so that either size of slot is in the upper position.

The bottom plate of the chute is a 4-in. wide and 19½-in. long piece of ⅜-in. cold-rolled steel. On either side of this plate is mounted a ⅜×⅜ in. cold-rolled steel spacer 18½ in. long. Above these spacers is mounted a top plate of No. 10 gage hot-rolled steel. As shown in the sketch, this top plate can be adjusted between a maximum of 0.470 in. and a minimum of 0.375 in. above the bottom plate. On either side of the assembly there are three groups of three mounting bolts. The center bolt passes through a clearance hole in the top plate and is threaded into both the spacer bar and the bottom plate. On each side of this bolt are adjusting screws, which are threaded into the top plate and pass through a clearance hole in the spacer to bottom on the top surface of the bottom plate. When the two screws are threaded fully into the top plate, their length is such that the top plate is supported 0.470 in. above the bottom plate. By withdrawing these screws from the top plate the necessary amount, and then tightening the center bolt further into the bottom plate assembly, the clearance between the top and bottom plates can be reduced.

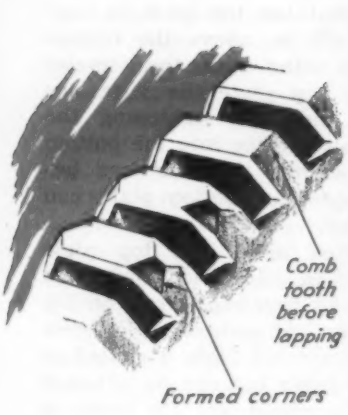
Supported under the top plate is a ⅜×½ in. cold-rolled steel guide bar held by four cap screws on 5½ in. centers. At each of these screw positions, the top plate is slotted so that the guide bar can be adjusted across the chute slot for parts of different lengths.



Adjustable for parts of different lengths and different diameters, this magazine feed assembly is designed for mounting on a No. 2-G Brown & Sharpe automatic screw machine. The feed block is clamped on the cross-slide of the machine so that the workpieces are individually transferred from the bottom of the feed chute to the collet chuck in the spindle

Stock Removal by Lapping Proves Feasible for Small Parts

BY NORMAN GRAY, CHIEF ENGINEER, SCHICK INCORPORATED



Corners on the comb teeth of the inner shearing member of the 2-M shaver are formed on a multi-ribbed lapping wheel. The operator places the piece in a loosely mounted holder and guides it so that the comb slots slip over the ribs on the wheel. Clover No. 2A grinding and lapping compound is applied to the wheel at intervals. Production exceeds 100 pieces per hour

THERE IS an exception to every rule, and Schick Incorporated, well-known manufacturer of electric dry shavers, finds that a departure now and then from conventional methods gives a better product at less cost. For example, mechanical lapping is not ordinarily thought of as a stock-removing process. But that is just how Schick uses mechanical lapping for one operation on the outer member of its 2-M shearing head. This operation might be called "underside" lapping, because the outer member is slid over and reciprocated on a stationary lap, while several thousandths of an inch are removed from an internal flat surface.

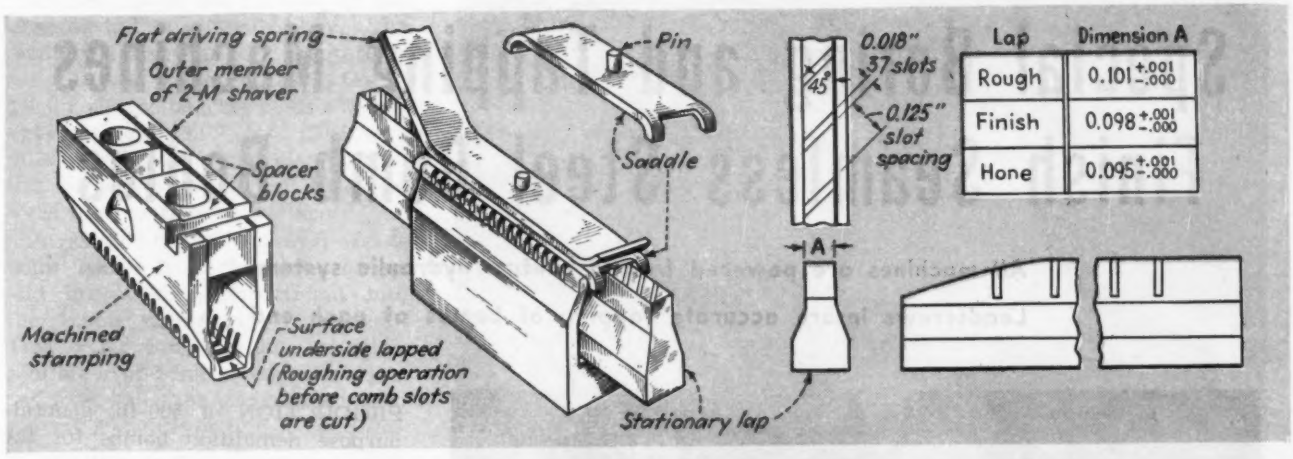
The outer shearing head is an assembly. The comb portion is a U-shaped machined stamping, which is soldered to two spacer blocks. An inner shearing head reciprocates within this assembly, requires a good flat bearing at the bottom of the U in the comb. Besides, the inner edges of the slots in the comb must be square and keen for effective shearing because beard is more difficult to cut than annealed copper, lead or aluminum filaments of equivalent cross-section.

Mechanical lapping is done in three stages. The first, or roughing operation, removes 0.003-0.004 in., thereby getting rid of any decarburized surface and pits from the heat-treated piece and producing a flat surface. The second operation, performed after cutting the comb slots with a grinding wheel, removes 0.0005-0.001 in. and is primarily intended for removing grinding burrs, and to produce a perfect shearing edge. Finally after plating the assembly, the bearing surface is lapped once more to remove plating burrs and any unevenness of the plate, and stock removal amounts to a few tenths. In reality, the last operation is a honing operation, because it is intended to produce a flat, highly finished surface.

Machines for underside lapping are mounted on benches. Each machine consists of a stationary lap holder and a pressure-applying head, which is reciprocated by a crank mechanism such as used in shapers. Several laps are laid parallel in the lap holder, being retained in place by slots in the frame. One workpiece is slid over each lap before the latter is dropped into place. Since the work must be driven, a "saddle" is placed on top of each piece. The saddle is a stamping with lugs at either end that fit over the ends of the outer shearing member, and has a pin protruding from the top. A flat spring, attached to the pressure head, rests on top of the saddle, and a hole in the spring engages the pin. Thus, when the head reciprocates, the piece is moved back and forth on the lap by the spring and is pressed firmly upon the cutting surface. Upon completion of the lapping cycle, the motor is shut off, the reciprocating head is lifted, the lapped pieces are stripped from the laps, new parts are slid over the laps, the saddles are replaced, the head is lowered to the operative position and a new cycle is commenced. Time cycles are: rough lap, 18 min.; finish lap, nine minutes, and hone, six minutes.

The abrasives used are important to the success of the lapping process. They are: for roughing—No. 500 Crystalon mixed with honing oil; for finishing—eleven parts of Chromitrom to one part of No. 500 Crystalon mixed in honing oil or kerosene, and for honing—Grade C Chromitron mixed in either honing oil or kerosene.

Lap wear depends upon the operation. When roughing, only one piece can be lapped before the tool needs resurfacing. For one thing, the edges tend to break down, creating a crowned effect; for another, a wavy surface on the lap may be produced, whereas it should be flat. For finish lapping, from two to three pieces are obtained per tool dressing. And for honing, an indeterminate number of pieces can be obtained.

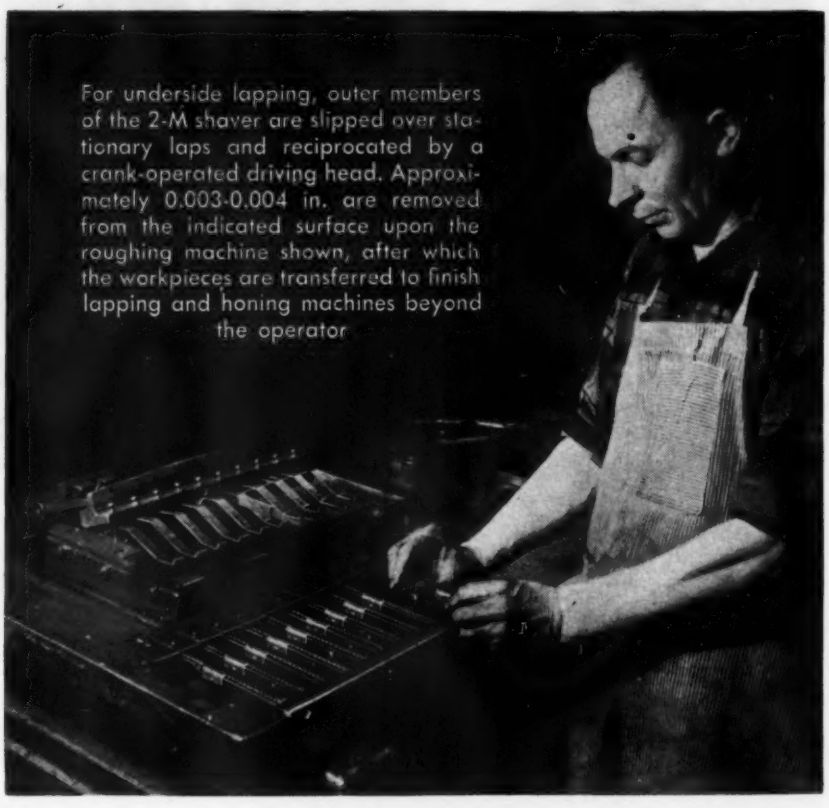


Economical refinishing of laps is done by mounting 30 at once on a magnetic chuck. The tools are placed at a 20-deg. angle with respect to the longitudinal axis of the grinder table. Thus, the grinding scratches left on the lap surfaces tend to trap lapping compound.

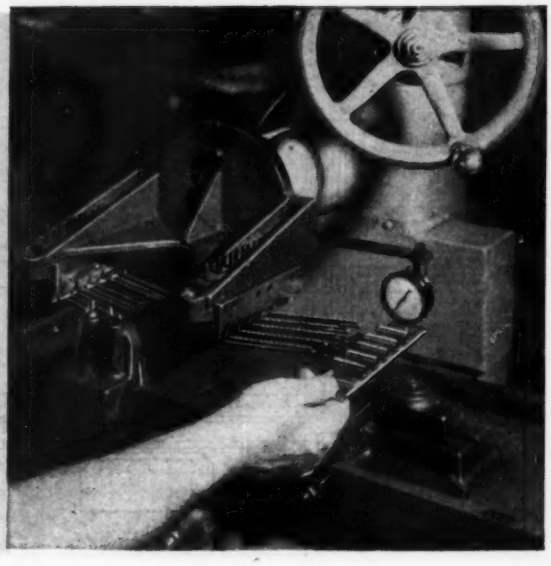
Many hundreds of thousands of outer shearing members for the 2-M head have been underside lapped successfully by Schick, but the management is conducting experiments with an improved method. In this set-up operating parts of the machine will be better protected against wear from lapping compound.

For the purposes of experiment, a Norton surface grinder was selected because its table ways and operating mechanism are fully protected against abrasives. To the wheelhead there is bolted a forked pressure pad. Each fork has seven spring pads for applying pressure to as many workpieces and holding them stationary. On the table there is mounted a double-sided lap-holding fixture. Outer ends of the laps are located by slots in a spacer support bar; the inner ends are held in a slotted member affixed to a horizontal shaft. Ease of loading and unloading the laps is secured by a pop-up feature. This is merely a spring-operated pin that causes the shaft to rotate slightly so that the free ends of the laps lift approximately an inch.

In operation of the experimental machine, outer shearing members are slid onto the laps with a loading fixture and the wheelhead is lowered by hand feed until the spring pressure pads engage the workpieces. Then the automatic table reciprocation is engaged. The wheelhead is fed down by hand until a specified dial indicator reading is reached.



For underside lapping, outer members of the 2-M shaver are slipped over stationary laps and reciprocated by a crank-operated driving head. Approximately 0.003-0.004 in. are removed from the indicated surface upon the roughing machine shown, after which the workpieces are transferred to finish lapping and honing machines beyond the operator

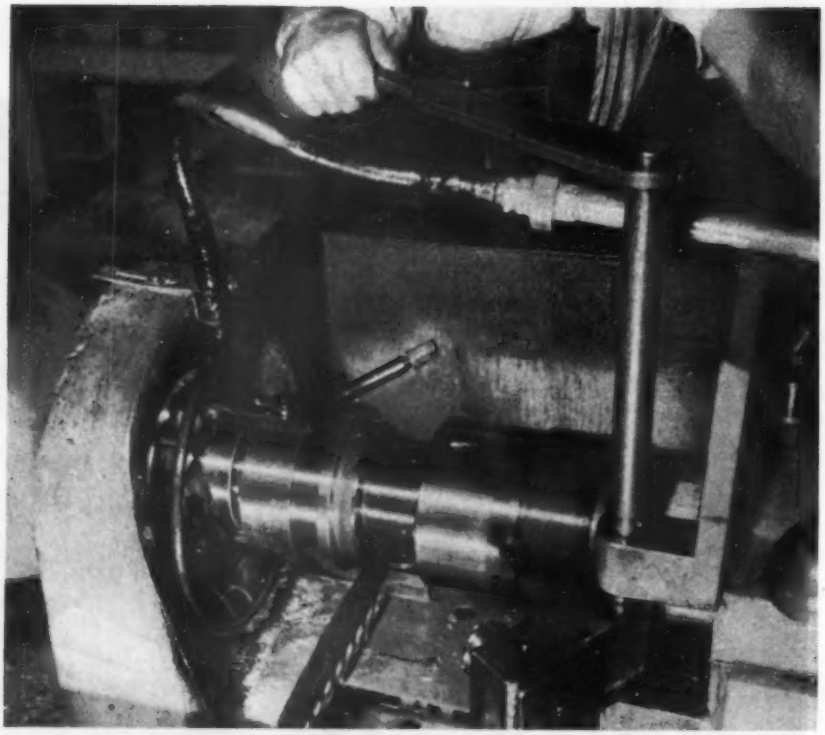


An experimental set-up for underside lapping involves a Norton surface grinder, because its moving parts are protected from lapping compound and automatic table reciprocation is available. A forked workholder incorporating individual pressure pads is fastened to the wheelhead, while the duplex lap holder is clamped to the table

Special Boring and Tapping Machines Finish Seamless Steel Bomb Bodies

All machines are powered from a central hydraulic system.

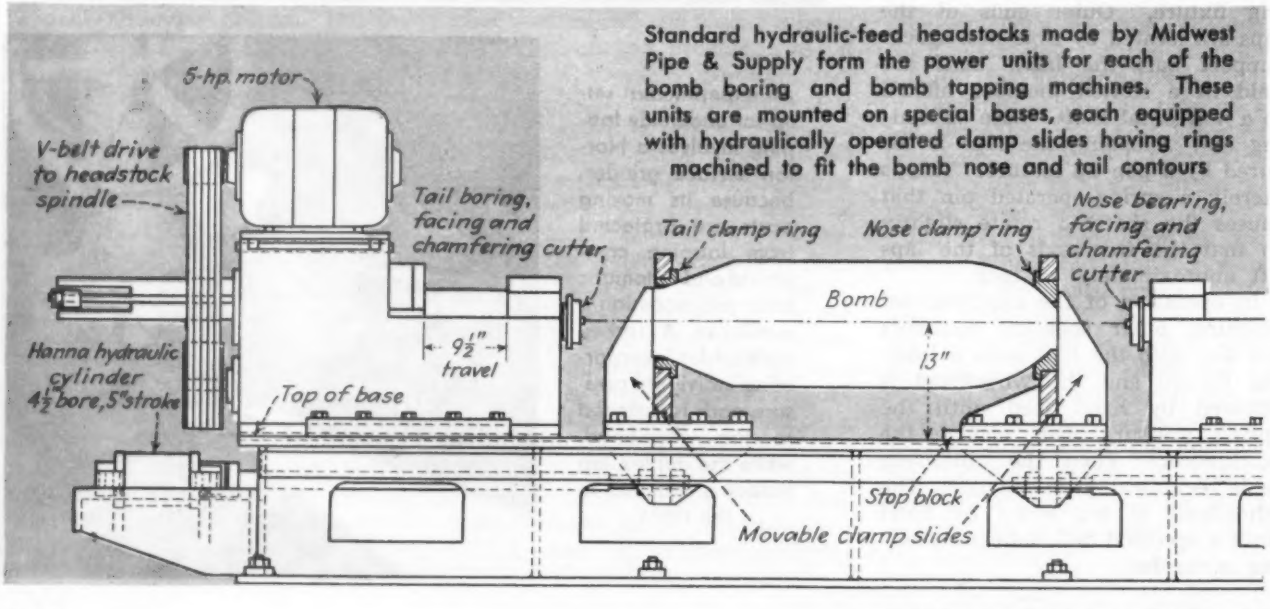
Leadscrews insure accurate tapping of bombs at each end



Each head of the bomb tapping machine is controlled by a separate operator. Lead of the threads chased with the taps is controlled by the leadscrew on the forward end of the spindle. When tapping, the leadscrew nut is swung against the leadscrew with the hand lever

PRODUCTION of 500-lb. general-purpose demolition bombs for the Ordnance Department of the U. S. Army is one of the major war production projects undertaken by the Quick Meal Division of the American Stove Company. The seamless steel bomb bodies are formed at each end in a special forge shop set up for this project and the bodies are heat-treated in conveyor-type furnaces before machining. When delivered to the machine shop, these bomb bodies are complete with lifting lugs.

A number of special horizontal two-spindle boring and tapping machines were designed and built by American Stove Company engineers for the bomb machining line. Each of these machines consists of a 11.5 ft. long welded steel base at each end of which is mounted a single-spindle hydraulic feed headstock made by Midwest Pipe & Supply Company. Each of these headstocks is driven by a 5-hp. motor through V-belts. Between the two headstocks on each machine are two hydraulically operated clamp slides, each of which carries a clamp ring



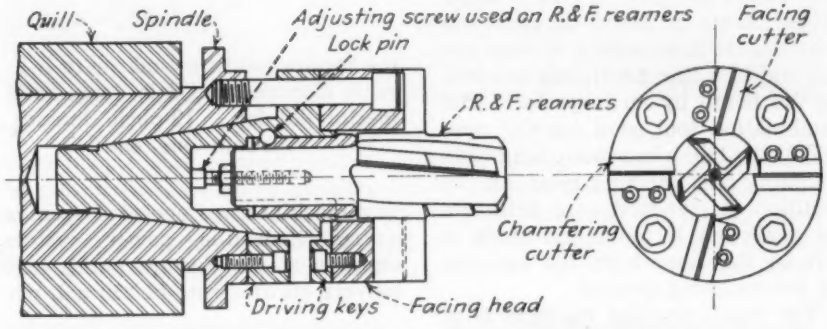
Standard hydraulic-feed headstocks made by Midwest Pipe & Supply form the power units for each of the bomb boring and bomb tapping machines. These units are mounted on special bases, each equipped with hydraulically operated clamp slides having rings machined to fit the bomb nose and tail contours

machined to fit the contour of the nose or tail of a bomb body. The contoured bores of these clamp rings are relieved to leave three 1¼ to 1½-in. square bearing lands 120 deg. apart around the bore. This permits more satisfactory clamping of the bomb body than if the bore were one continuous surface.

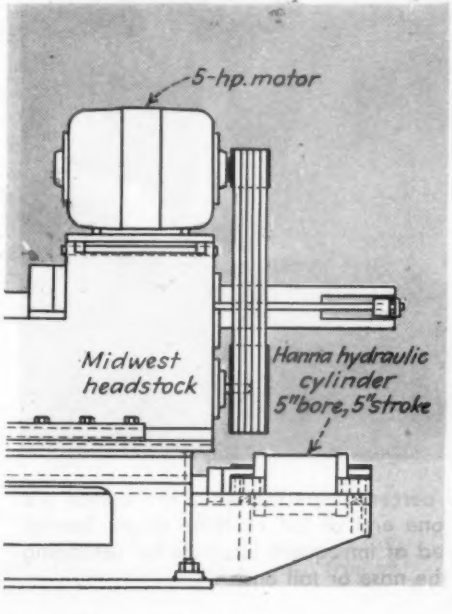
A single roller conveyor feeds bomb bodies from the heat-treating and lug welding department into the bomb machining department. This roller conveyor line parallels a number of bomb machining units, and fixed rail-type bridges feed from the roller conveyor line to the loading position of each machine. These bridges are set so that there is ¼-in. clearance between the top of the bridge and the bottom of the bomb when the clamp slides have been moved together to raise the bomb body into the clamp rings. On the other side of the bomb machining line is another roller conveyor line which feeds the machined bombs to a nose and tail tapping machine. Counterweighted bridges support the bomb bodies when they are moved from the boring machines to the second conveyor line. These bridges are raised when not in use to provide room for the operator of each machine to work.

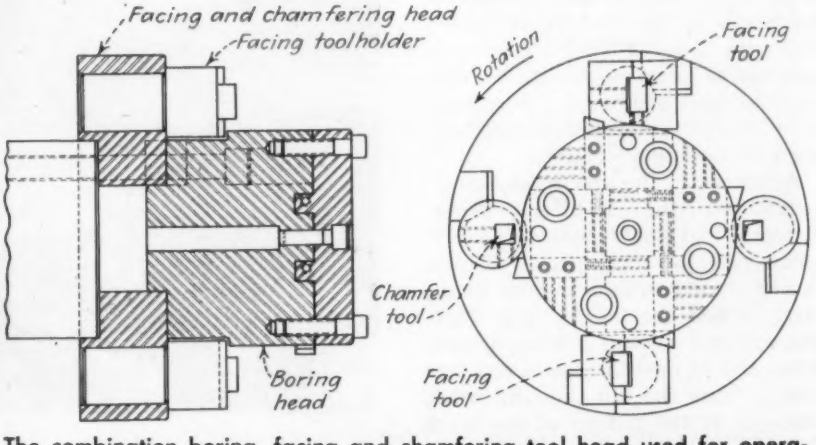
Multiple-tool boring, facing and chamfering heads are employed on each spindle of the bomb machining unit so that the tail and nose surfaces can be finished simultaneously. After a bomb body has been clamped in place, the operator starts the tail spindle, which operates at 24 r.p.m. with a feed of 0.090 in. per rev. Then he goes to the nose end of the machine and rough reams and

Bombs are loaded into one of the special boring machines by means of a rail bridge leading from a roller conveyor at the rear. Clearance of ¼-in. between the top of bridge and bottom of bomb, when bomb is clamped between holding jaws, eliminates need for removing bridge

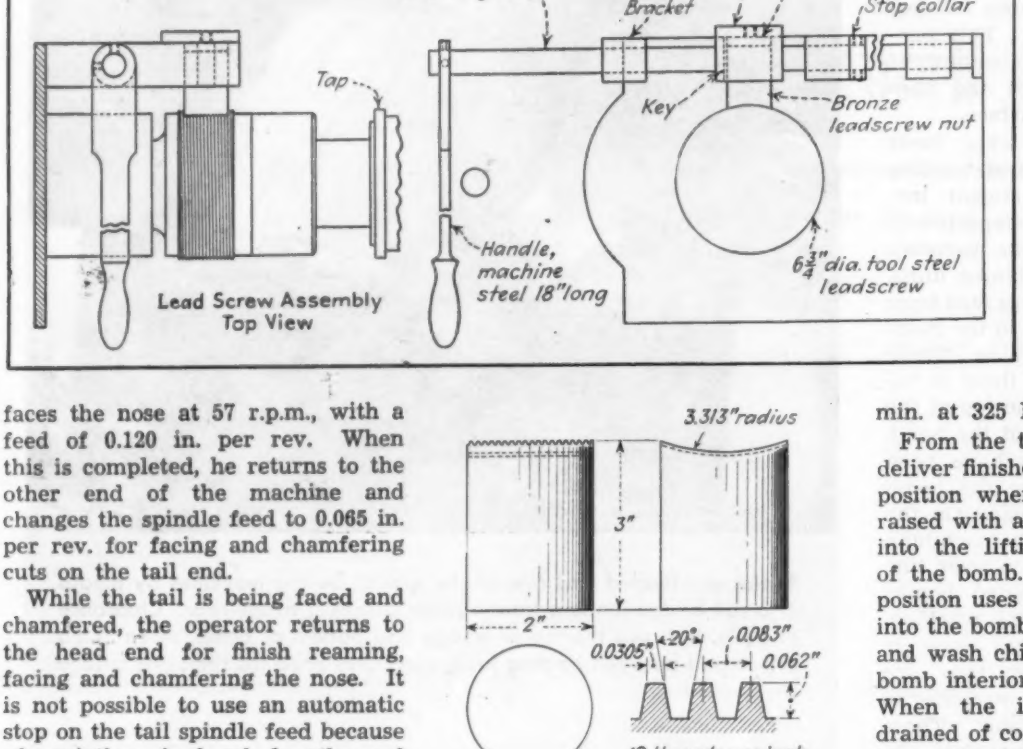


Tool heads employed for machining operations on the nose end of each bomb have fixed facing and chamfering cutters, as well as interchangeable roughing and finishing reamers. A core drill can be used ahead of the roughing reamer if the stock to be removed is too heavy





The combination boring, facing and chamfering tool head used for operations on the tail end of each bomb carries four boring tools 1¾-in. ahead of the facing tools. Facing and chamfering cutters are held in individual tool blocks so they can be set for proper height when resharpened



Duplicate leadscrew units are provided for the nose and tail tapping spindles. The bronze leadscrew nut is keyed into a nut-holder supported from a shaft carried by three brackets bolted to the headstock. The leadscrew is chased in a tool steel spindle extension

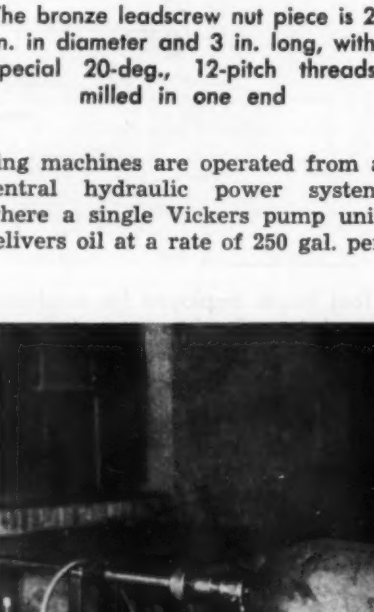
faces the nose at 57 r.p.m., with a feed of 0.120 in. per rev. When this is completed, he returns to the other end of the machine and changes the spindle feed to 0.065 in. per rev. for facing and chamfering cuts on the tail end.

While the tail is being faced and chamfered, the operator returns to the head end for finish reaming, facing and chamfering the nose. It is not possible to use an automatic stop on the tail spindle feed because of variations in bomb lengths and contour. It is necessary to face the tail end to a line previously marked on the bomb by an inspector. The combination tool used for the nose end of the bomb has interchangeable roughing and finishing reamers. In addition, a standard core drill can be employed if too much stock is left in the nose bore for removal by the roughing reamer.

The bomb tapping machine is of special interest because of the use of leadscrews to insure accurate tapping at each end. This tapping machine is of the same basic design as the boring machines. The 6⅜-in.-12-NS-1 tap for the tail end of the bomb is operated at 24 r.p.m., while the 2-in.-12-NS-1 nose tap is operated at 40 r.p.m. Geometric collapsible taps are used. A soluble oil coolant is employed for all boring and tapping operations.

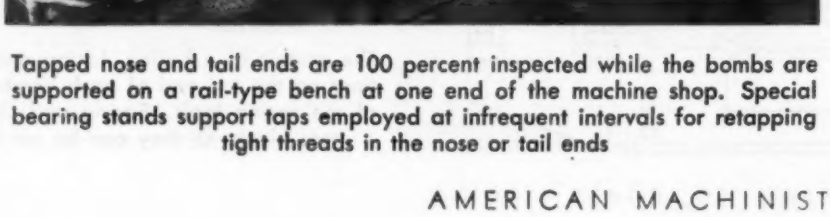
As shown in the accompanying illustrations, the 12-pitch, 6¾-in. diameter tool steel leadscrew spindle extensions have a special 20-deg. thread chased on their outside diameter. When the tap is in position, the operator swings a bronze leadscrew nut against this leadscrew section to feed the tap into the work. Because of the nature of the work done at each tapping spindle two operators are required at the tapping machine.

All of the bomb boring and tapping machines are operated from a central hydraulic power system where a single Vickers pump unit delivers oil at a rate of 250 gal. per min. at 325 lb. per sq.in. pressure.



The bronze leadscrew nut piece is 2 in. in diameter and 3 in. long, with special 20-deg., 12-pitch threads milled in one end

From the tapping machines, rails deliver finished bombs to a cleanout position where each bomb body is raised with an electric hoist hooked into the lifting lug near the nose of the bomb. The operator at this position uses a hose to flush coolant into the bomb through the nose hole and wash chips and dirt out of the bomb interior through the tail hole. When the interior is clean and drained of coolant, this operator returns the bomb body to the rail stand and rolls it along to an inspection station. Here, shop inspectors check each end of the bomb body and move it onto a conveyor for delivery to a cleaning room where the bombs are submerged in an alkali cleaner and then rinsed with hot water. Later, the operations on these bomb bodies include final Ordnance Department inspection.



Tapped nose and tail ends are 100 percent inspected while the bombs are supported on a rail-type bench at one end of the machine shop. Special bearing stands support taps employed at infrequent intervals for retapping tight threads in the nose or tail ends

Shell Case Output Doubled By Arc Welding Procedure

Savings in time, material and manpower have been accomplished by improvements in fabricating technique. This arc welding method replaces a slower and more costly production method and improves the part quality

PHOTOS COURTESY OF THE LINCOLN ELECTRIC COMPANY

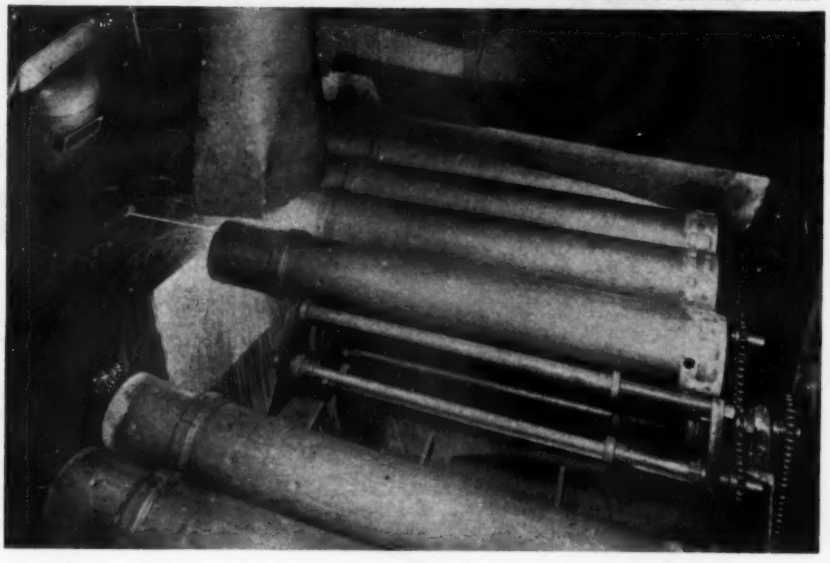
TUBULAR CASES for 90-mm. shells are welded by The Coolerator Company, at the rate of 250 units per hour by three welding operators, as compared to the former output of about 45 cases per hour with eight workers.

The welding procedure supplanted the previous method of sealing the drawn cupped head of the shell case by dipping the edges into molten bronze. Although the fusing of the cupped head into the shell case is the only welding involved in the present set-up, it is one of the principal operations in the entire fabrication procedure.

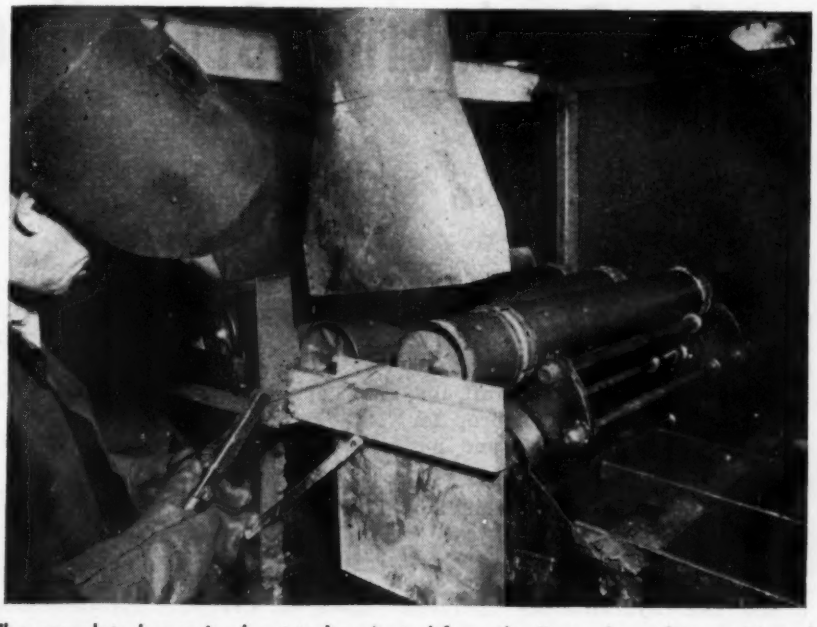
The case is made up of a 3½ ft. length of 14-gage pipe, a dished head about 5¼ in. in diameter and various circular guides and reinforcements. These parts are all press fitted into one assembly, the cupped head being pressed into the end of the cylinder so that the flanged edge fits flush with the cylinder edge.

The cases are then placed on a rotary endless conveyor which feeds the assemblies in line to a motor driven pick-up jig which holds the work in position for welding the cupped head to the cylinder while rotating the shell at a uniform speed of 14 seconds per revolution.

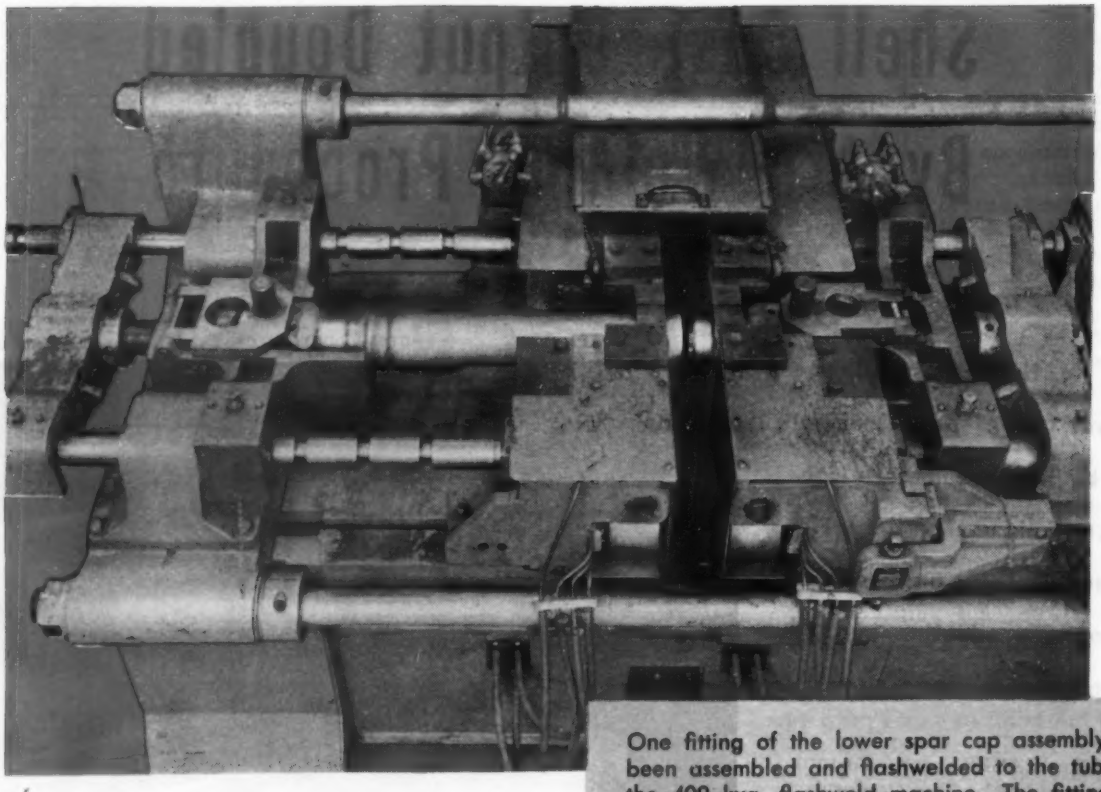
The finished shell cases are tested for leakage under ten pounds pressure with rejects averaging only about two percent. Completed welds are not buffed or ground, the weld head being uniform and free of porosity.



This motor driven jig holds a case in front of the operator where a rotary motion turns the work counter-clockwise while the operator holds an electrode in the most effective welding position. When the shell case makes a complete revolution, the operator depresses a foot lever, releasing the finished case and dropping another to welding position. The operator allows only for rod burn-off as the shell case rotates at a speed of 14 seconds per revolution



The completed case is about to be ejected from the jig and another positioned for welding. The fixture, which delivers, rotates and ejects cases from the holding position, minimizes the handling time necessary to produce a completed shell and permits most of the operator's time to be devoted to welding



One fitting of the lower spar cap assembly has been assembled and flashwelded to the tube by the 400 kva. flashweld machine. The fitting for the opposite end is held in place by the swing-gate locator and is ready for flashwelding

Flashwelding Proves Economical In Producing Crew Nacelle Spars

BY J. L. GRAUX, NORTHROP AIRCRAFT, INC.

FLASHWELDING serves as an efficient fabrication method in the mass production of crew nacelle spars for the Black Widow P-61 Night-Fighter turned out by Northrop Aircraft, Inc. It has been in use at Northrop for the past year and a half and has fulfilled rigorous test requirements.

The equipment consists of the following flashweld machines: a 20 kva. cam-operated machine; a 100 kva. hydraulically operated machine; and a 400 kva. hydraulically operated machine. These machines have capacity for flashwelding sheet, bar, and tubing ranging from battery vent trap jar links of 0.003 sq.in. cross-sectional area to crew nacelle spars of 4.11 sq.in. cross-sectional area.

Flashwelding equipment replaces arc welding in the fabrication of critical aircraft parts on the Black Widow plane, and the spars are 20 percent stronger

In the original design of the spars, SAE 4130 forgings were arc welded to SAE 4130 tubing. The spars were redesigned, and flashwelding selected as the fabrication method because of its high strength and economy as a mass production fabrication method. The flashwelded spar is 20 percent stronger than the arc welded spar; the design allowable for flashwelding is 100 percent of the base metal strength versus 80 percent for arc welding. In addition, there is a weight saving of 4.55 lb. and a cost reduction of 60 percent.

The flashwelded spar consists of two machined SAE 4140 forgings flashwelded to SAE 4140 tubing with 4½ in. outside diameter and 5/16 in. wall thickness. During the course of

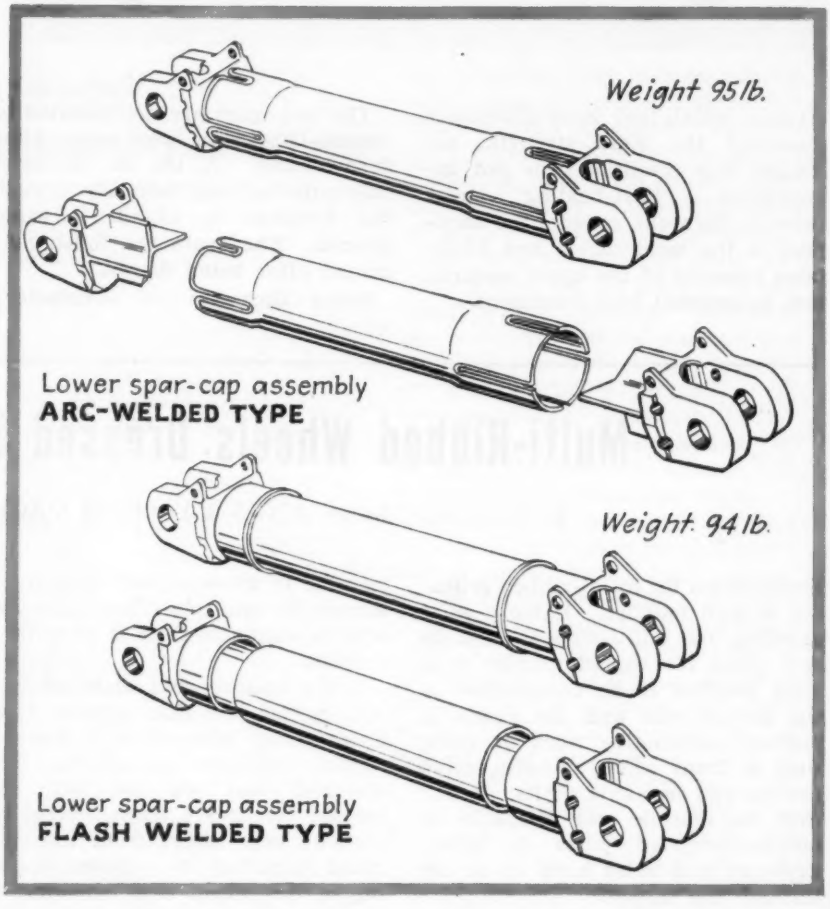
various tests, the following combinations of normalized SAE steel alloy forgings and tubes have been satisfactorily flashwelded together at the same machine setting: 4130 to NE 8739, 4130 to 4140, 4140 to 4140, 4340 to 4340.

The spar tubes are cut to length and held to a linear tolerance of plus or minus 0.020 in. The forgings are bored out to 3.875 plus or minus 0.005 in. inside diameter; the outside diameter of the forging is machined to 4.500 plus or minus 0.005 over a 4 in. length. The concentricity of the two machining operations is held to 0.010 in. full indicator reading. The forgings are chamfered 30 deg. back from abutting face leaving a flat of from 0.005 to 0.078 in. of wall thickness. The outside surface of the tubes is blasted with steel grit to remove foreign material and provide a clean contact surface for the current-carrying jaws of the flashweld machine.

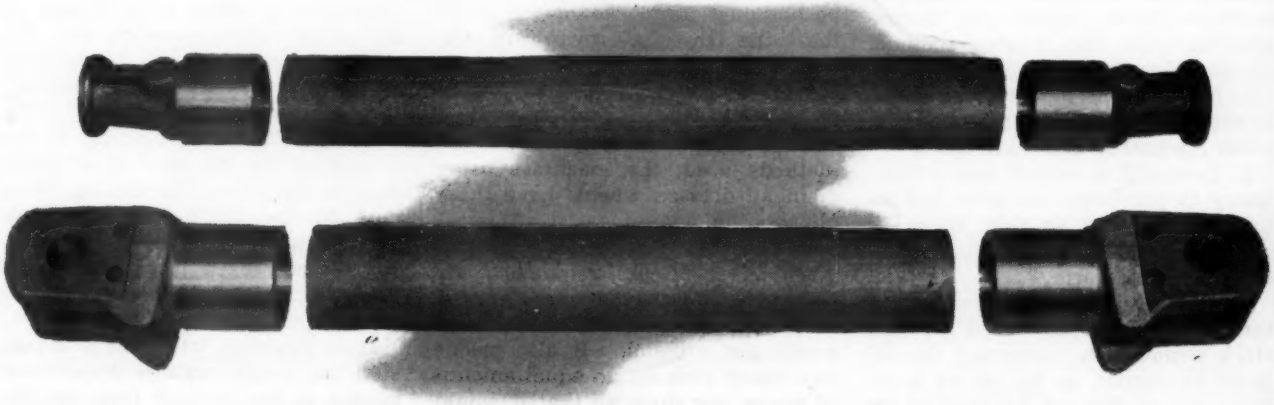
A locating fixture aligns the two forgings until the forging and tube are gripped by the machine. The pins that go through the holes in the clevis forgings are removed, and the tooling serves only as a "back-up" to prevent slippage during the welding operation; the flashweld machine holds the alignment once the jaws are clamped. The pins are removed during the welding operation, because the springback in the machine causes a binding of the pins. The tooling for the upper spar serves the same purpose as that for the lower spar, but the aligning method is slightly different due to the nature of the design.

The holes in the forgings are ¼ in. diameter under finished size and the faces of the clevis are rough machined, although the distance between the hole centers is held to plus or minus 0.040 tolerance in the flashweld operation. This procedure is necessary due to the close alignment and close linear tolerance required on the spars.

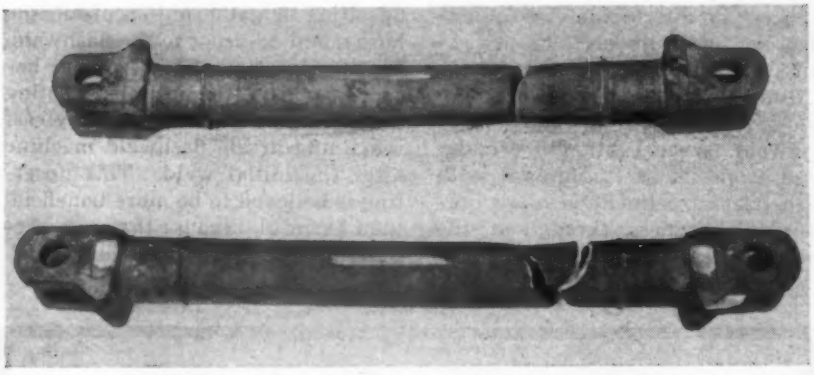
Although post-heating is not necessary to produce a satisfactory flashweld, several benefits are derived from its use. Material with "post-heat" treatment is more uniform in hardness throughout the weld and heat zone than material in the "as-welded" condition. A slight upsetting or gathering occurs in the base metal adjacent to the flashweld, because the heat affected zone becomes plastic during post-heating and absorbs the internal springback remaining in the flashweld machine after the initial weld. This upsetting is believed to be more beneficial than harmful, because the cross-section adjacent to the weld line is in-



A comparison of the design for arc welding and the design for flashwelding shows the reduction in forging and machining operations permitted by the change from arc to flashwelding operation



The major components of the upper and lower spar assemblies are shown after all machining preparation for flashwelding has been completed



Destructive tests of the lower front spar show failures in the tube occur away from the flash-welded section

creased, which may have effectively increased the weld strength, although this condition was not investigated. "Post-heating" stress relieves the weld, reduces the hardness in the weld region and facilitates removal of the upset material and subsequent heat-treatment.

The two spars are heat-treated to 160,000-180,000 lb. per sq.in. after flashwelding. A 1¾ in. diameter hole is drilled longitudinally through the forgings to obtain a rapid quench. The spars are finish machined after being drawn.

Since there is no satisfactory method for non-destructive inspection of flashwelds, all the lower tension spars with the clevis forgings are proof loaded in tension to 90 percent of the ultimate load while the quality of the upper compression spar is controlled by the results of the proof loads of the lower spar.

The first three spars flashwelded were heat-treated and pulled in tension to destruction with all failures occurring in the base metal.

To date, over 2,000 flashwelds have been made on the spars with eleven weld failures occurring at high loads during proof loading.

Multi-Ribbed Wheels Dressed by Diamonds

BY H. SCHLARMAN, JONES & LAMSON MACHINE COMPANY

ENTHUSIASM for multi-ribbed grinding is well founded. It looks as if grinding by multi-ribbed methods will place the thread grinder in a good position to be competitive to the thread mill and die heads in postwar automotive work on parts such as front wheel spindles, drive pinions and rear axle shafts. It will even be feasible and desirable on non-heat-treated parts in which keyways and holes have to be cut through the thread.

Many engineers believe that diamond dressing for multiple-ribbed thread grinding has numerous advantages over crushing. The advantages of diamond dressing of multiple-ribbed wheels for thread grinding over the crusher method are as follows:

1. It is possible to dress the wheel to more accurate form than it is to crush a wheel to this same form.

2. Crushing a wheel has a tendency to pulverize the grits and to loosen the bond so that there is rapid breakdown of the wheel relative to thread form.

3. The resinoid wheel which is the wheel universally used for fast stock removal on production thread grinding cannot, as far as we have been able to find out, be crushed by the crusher method. This limits the crusher to the vitrified wheel. It is possible to dress a much finer pitch thread for multiple-ribbed grinding with a diamond than it is with a crusher.

4. We believe that diamond cost will be far less than crusher cost. From what information I have a crusher will run around $60. The diamond that we use will run around $12 or $14 when bought by the customer direct from the diamond manufacturer. Every crushing of the wheel is detrimental to the accuracy of the crusher thread form. It is evident that the number of crushings that will be available from a crusher will not approach the number of dressings that can be obtained from a diamond. Further the cost of reworking the crusher will be far greater than the cost of relapping a diamond which is about $2 or $3.

Leaving the principles of the methods used, the machines using diamond-dressed wheels have these outstanding advantages:

1. The standard 20-in. diameter wheel gives 2½-in. of wheel wear on radius against about ¾ in. on the crusher machine. This means more pieces per dressing. It also means that based even on an equal amount of pieces per dressing that it would be necessary to change wheels two or three times as often on the crushed-wheel machine. This, of course, would mean anywheres from an hour and a half to two hours excess loss time.

2. On the crushed-wheel machine, dressing time is lost time since the operator must stop the machine to dress the wheel. On the diamond-dressed machine, the dresser automatically dresses on the return stroke and there is very little lost time. Further it takes two or three times as long to crush the wheel and get size as it does to dress the wheel automatically with a diamond.

3. Besides the multi-ribbed method of plunge cut grinding on threads up to 1½ in. long, another method of grinding long threads on the multi-ribbed machine has distinct advantages. It is actually multi-rib but works on a little different idea of wheel form. The wheel is dressed something in the nature of the chamfer of a chaser and is equivalent to taking three cuts on the work with one pass. This principle of multi-rib grinding has already been used on oil-well work and from all reports it has really done a wonderful job.

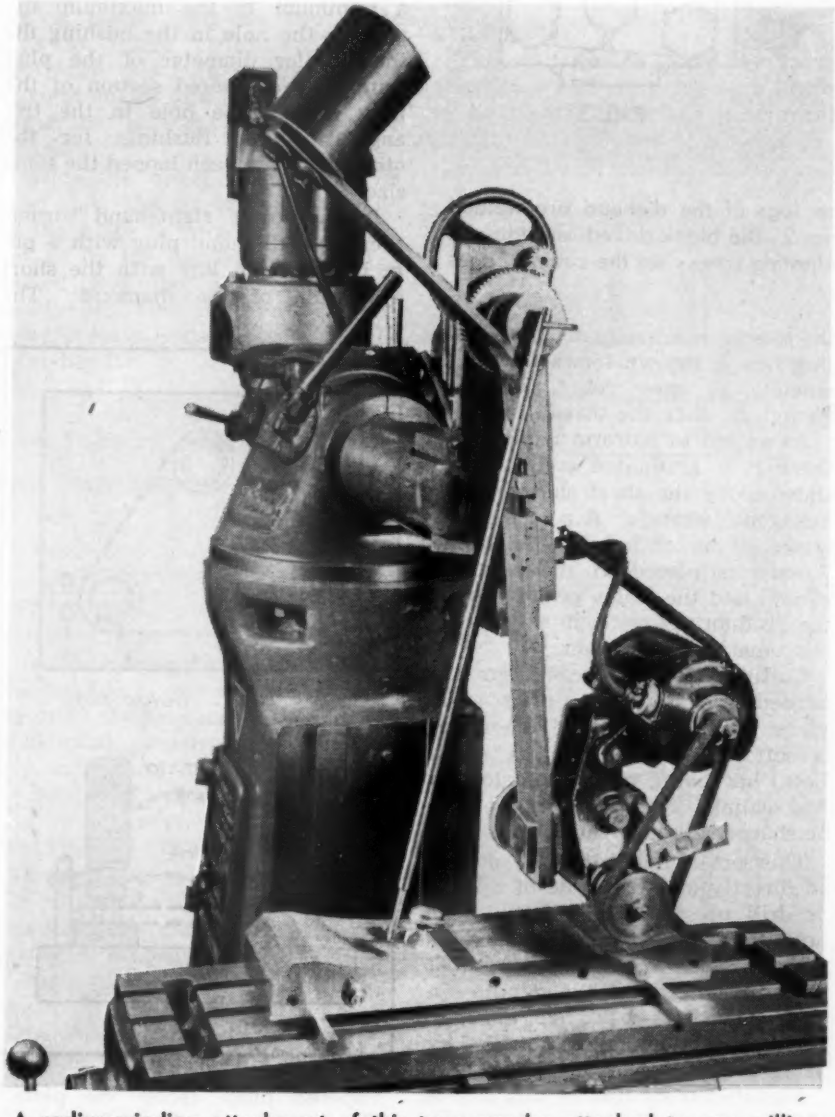
It is, however, true that it is possible to crush certain forms that cannot at the present time be diamond trued. Crushing seems to work out handily on form tool work.

Practical Ideas

★ **War-Winning Suggestions appearing here were recognized as meritorious by the Board for Individual Awards, War Production Drive, and the Navy Employees' Suggestion Program. They are offered to industry to aid in war production** ★

Large-Radius Cams Ground By Milling-Machine Attachment

BY GEORGE KOCIAN
Toolroom Foreman, The Yoder Company



A radius-grinding attachment of this type can be attached to any milling machine with an overarm. The dial gage checks for wheel wear

It is not an easy task to grind a large radius on several cams, so that all of the cams are exactly alike. We were faced with this problem in connection with cams for an eight-spindle machine. The job was done by bolting together the rough-machined and heat-treated cams, and placing them on the table of a universal milling machine. The head was removed from the machine, and in its place we put a counterweighted radius-grinding attachment of our own design. Grinding the radius on the workpieces is done by swinging the wheel in an arc, and operating the table cross feed.

The swinging arm of the grinding attachment is pivoted on an upright that is applied to the head adapter on the milling machine. Oscillation of the arm is brought about by operating a handwheel which drives through a pinion and gear. Mounted at the same pivot point is a gage bar with a dial indicator attached to its free end for checking curvature of the radius ground on the cam and wheel wear. Grinding is done by a conventional grinding attachment fastened to the swinging arm. A coil spring supports the weight of the motor, maintains tension on the belt. Adjustment of the wheel is obtained by push and pull screws on the swinging arm, which is of two-piece construction.

Stud Threading Diehead Used in a Drill Press

BY R. A. SCHULTZ
Foreman, Noblett & Forrest, South Australia

For chasing threads on large quantities of studs, we made an effective diehead, which is cheap to manufacture. Because the drill presses were not too busy, the tool was adapted to a vertical-spindle machine, although it could be applied to a lathe.

A round shank was welded to a

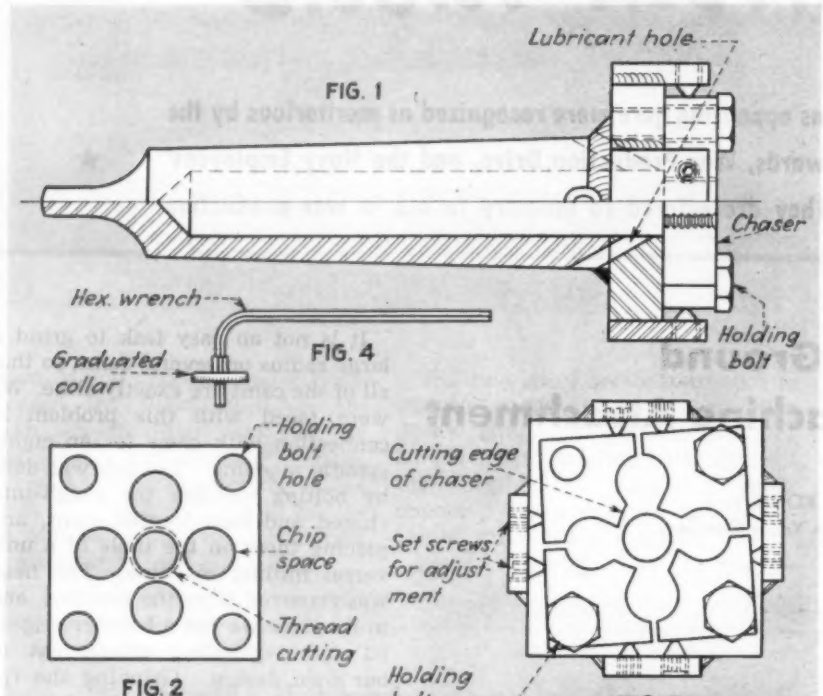


Fig. 1—Shank, head and adjusting screw lugs of the diehead are welded together to make an inexpensive tool. Fig. 2—Die blank drilled and tapped. Fig. 3—Chasers are bolted in position; adjusting screws set the cutting edges

square piece of flat bar stock. On each side of the head, lugs were welded to support hollow-head setscrews for adjusting the chasers.

The shank was taper turned to fit the drill spindle socket and the contact surface of the head was machined flat. To accommodate the threaded end of the stud, a hole larger than the stud diameter was drilled short of the full length of the shank. To lubricate and cool the cutting face of the chasers, holes are drilled through the top of the head, close to the cutting edges.

The die is made from a square piece of tool steel. Four holes were drilled for chip spaces and a central hole was drilled and tapped for thread cutting; the four chip space holes do not come too close to the thread cutting hole, so no burrs are raised on the thread. After all machining has been completed, the die is cut into four sections and the front rake and clearance are machined on each cutting face. The first two threads are ground off about 45 deg. to produce a good thread without tearing the metal.

Holding bolts are located in the corner of each chaser, so that, when the setscrews are adjusted, each cutting face is thrown forward a slight amount to give relief, but not enough to alter the thread form.

As an aid to uniform adjustment, there is a graduated collar which slides along the short shank of the hexagonal wrench. A zero mark is scratched on each lug. When the wrench is placed in the setscrew socket, and the collar pushed down, the graduations assist in controlling micrometric adjustment.

Cutting edges of the chasers are hardened locally by use of an acetylene torch, the rest of the metal is soft because it does no work. Local hardening prevents distortion and scaling. This type of chaser can be sharpened many times.

This sort of diehead can be mounted directly in the spindle of a lathe or drill press, while the studs are held in a self-centering chuck or collet. After the correct length of thread has been cut, the spindle can be reversed to back off the die; rapid production may be obtained by using a quick-reversing diehead.

Manufacturing cost of this tool is reasonable, and additional chasers can be made up in a short time.

Three-Hole Locating Gage for Checking Size and Position

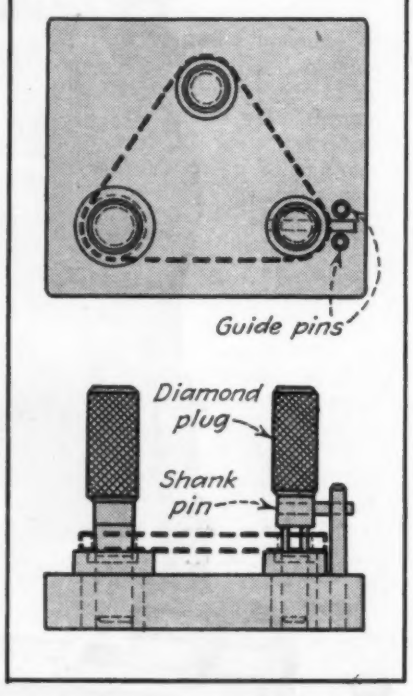
BY M. W. BOSSMAN

Gaging three holes accurately to determine their location and the direction of error, in addition to the diameter of each hole, is not always a simple matter, yet here is a way to do it.

First, the bushings must be accurately located and the diameters of their holes made a very close fit with the plugs and concentric with the body diameter of the bushing.

With regard to the lower left-hand plug, its lower end is ground to a diameter slightly smaller than the lower limit of the hole and the upper part has a finished diameter slightly larger than the upper limit. The space between is tapered from a minimum to the maximum diameter; the hole in the bushing fits the smaller diameter of the plug snugly. The tapered section of the plug centers the hole in the triangular plate. Bushings for the other holes are each lapped the same size.

In the lower right-hand corner, there is a diamond plug with a pin in its shank in line with the short dimension of the diamond. The



Tapered plugs center the plate. The error can be found by checking pairs of holes

Have You a Practical Idea?

. . . If so, send it in. Your idea will help other men, in other shops, who have a problem similar to yours. Thus the plowback of experience will promote progress and prevent repetition of past errors. But be certain your idea is really practical—no day dreams or untried whimsies are wanted. We pay for contributions prepared exclusively for this publication.

gaging diameter is tapered similar to the left-hand plug. The shank pin is placed between two guide pins to assure contact points to centralize this hole in the position at right angles to a line through the center of the right- and left-hand plugs.

When the upper plug enters its hole, then the location of the hole in the plate is correct. If it does not go in, the diamond plug is removed and the plate is rotated slowly until the plug enters. The same process is used for the lower right-hand hole.

Rivet Spinning Attachment for Drill Press Spindles

BY WALTER L. BLAND
Oregon Shipbuilding Corporation, Portland, Ore.

Pliers, tongs and electrode holders are difficult to operate if the pin is headed by upsetting or peening. The trouble is due to expansion of the rivet shank caused by the applied axial pressure. To overcome this annoyance, it is customary in the hardware and automotive industries to roll over the head with a rivet spinner. This tool should find more general application.

In one tool, two hardened steel wheels are journalled on a hardened steel pin. This assembly is held in a chuck having a standard taper tang to fit the drill socket.

Operation is secured by bringing the rivet spinner down upon the projecting shank of the rivet or pin. Rapid rotation of the spindle and axial pressure from the feed flows the metal to the shape of the rolls. There results a small tip at the center, due to clearance between the rolls.

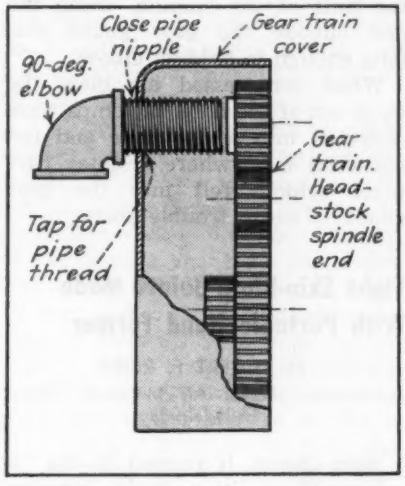
Because of speedy operation, the saving in man-hours is appreciable and a better product results. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

Air-Blown Chips from Spindle Bore Collected During Cleaning

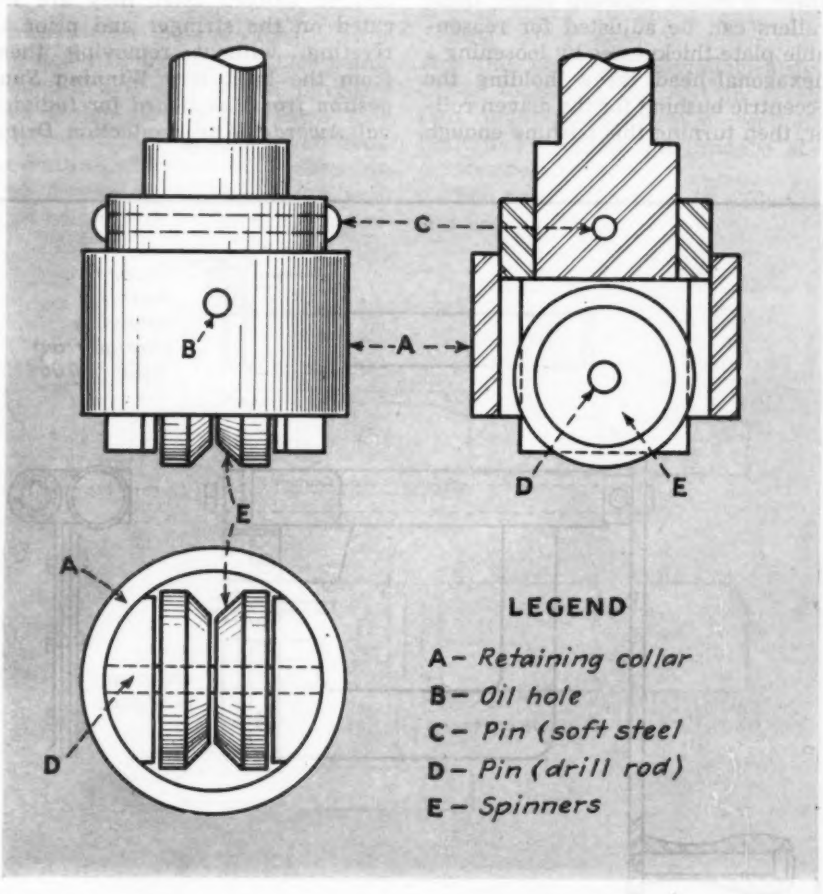
BY DONALD R. TRYER

Chips accumulate about the chuck and in the spindle bore of an engine lathe during manufacturing operations. Cleaning by hand is not adequate, so compressed air is used to remove the chips from the chuck and spindle.

The construction of many lathe spindles is such that chips are likely to be blown inside the gear train guard. To prevent this nuisance, the gear guard was tapped for a close pipe nipple whose inside diameter would pass the largest bar stock the lathe would take. The inner end of this nipple just cleared



A short nipple fits close to the spindle butt and keeps chips out of the gear train



Shank of rivet spinning tool fits into a drill chuck or it may be tapered to fit into the drill spindle socket

the butt of the spindle, while the end outside the gear guard was long enough to hold an elbow.

When compressed air blew the chips out of the bore, the chips were deflected into a container and not scattered everywhere. Metal particles seldom fell into the gear guard to cause trouble there.

Tight Skin-Plate Joints Made With Portable Hand Former

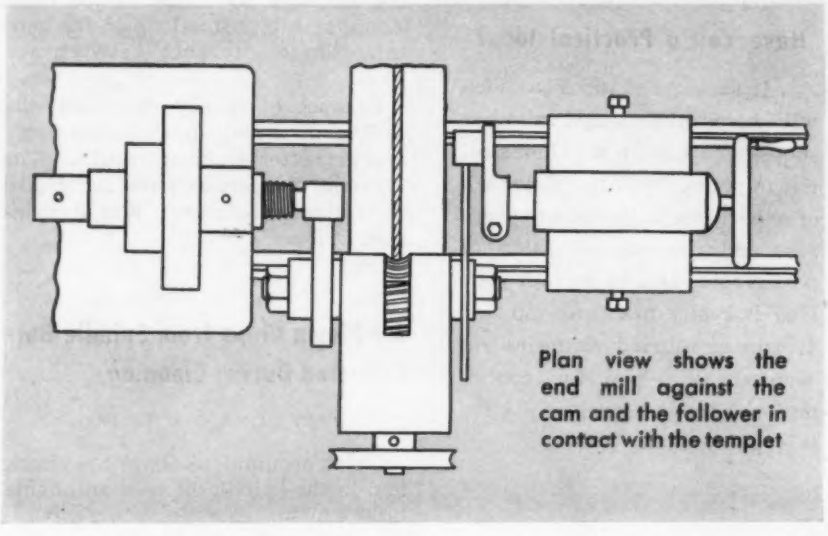
BY ROBERT F. RIDER

Leadingman, Naval Air Materials Center, Philadelphia

Skin sheets, if riveted in the "as trimmed" condition, buckle between rivets and the edges do not fit closely. To prevent this condition, a slight flange is formed which will pull down firmly after the rivets are set.

A former has been made with a welded frame of steel plate and bar stock. Along the lower edge of the frame is a guide bar which acts as a gage. A pair of rollers, tapered at one end, form a slight flange as the sheet is rolled between them; these rollers can be adjusted for reasonable plate thicknesses by loosening a hexagonal-head screw holding the eccentric bushing for the driven roller, then turning this bushing enough to accommodate the sheet thickness. Afterwards the screw is tightened. Flanging is done by placing the edge of the sheet between the rollers and turning the handle.

Previous practice was to form the flange by hand, often on the bench. With this hand former, the sheets can be flanged after they are located on the stringer and prior to riveting, without removing them from the hull. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



Plan view shows the end mill against the cam and the follower in contact with the templet

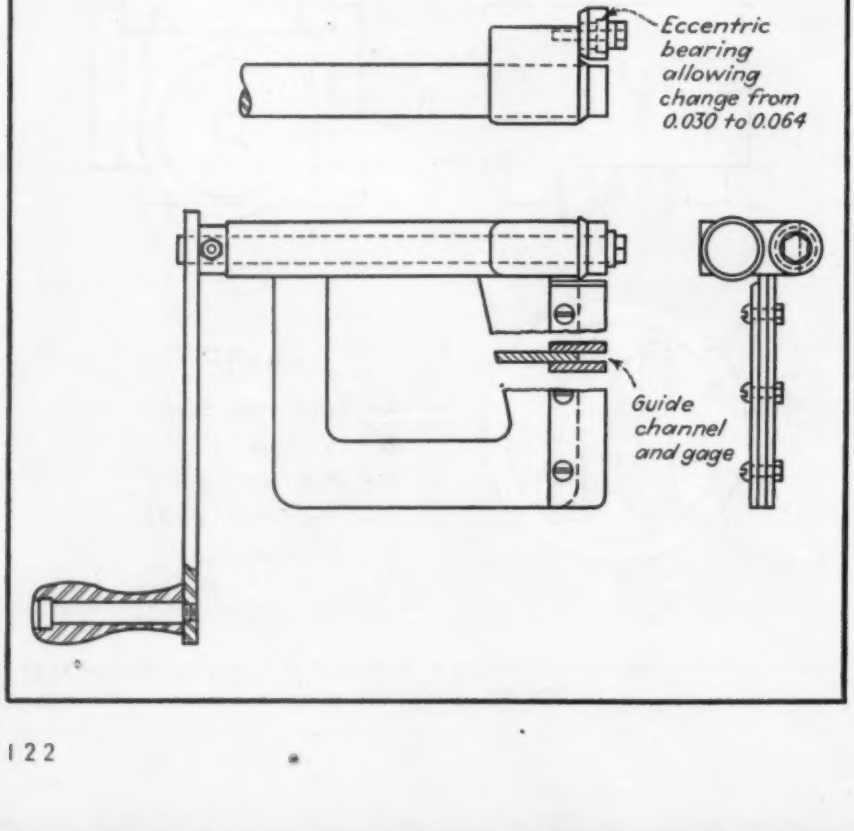
Engine Lathe Converted to An Accurate Cam Miller

BY HARRY FLEISHER

Quite often, production problems arise for which there are no suitable machines available, especially when the quantities are not large enough to demand the purchase of a special machine. Here is case where a machine was altered to a purpose for which it was never intended.

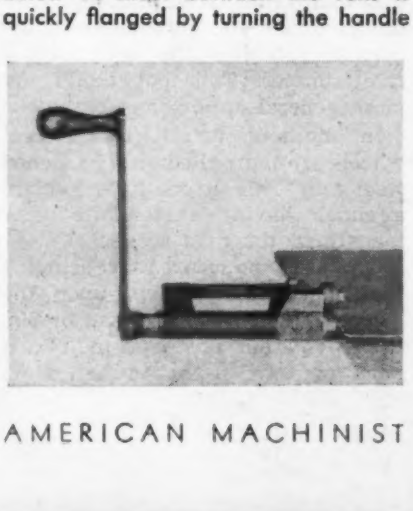
A number of cams were to be cut, but there was no machine on hand capable of doing the work. An accurate templet of the cam contour could be made without difficulty, but to transfer this shape to the actual blank was another matter.

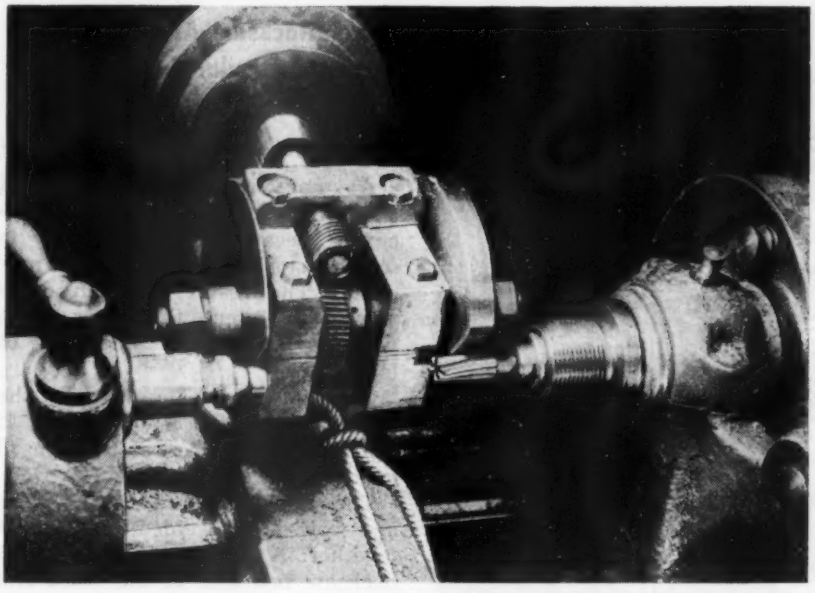
Finally, a lathe was chosen. An



Left—When the sheet is fed through the guide channel, tapered rolls form a slight flange which binds against its mating plate and forms a good joint

Below—A sheet between the rolls is quickly flanged by turning the handle





From the rear of the lathe it is evident that the wormwheel rotates the templet and cam, while the end mill spindle follows the profile of the templet as it contacts the roller follower

end mill was mounted in the headstock spindle and a roller follower was put in the tailstock spindle. On the cross-slide was mounted a wormwheel whose shaft carried the templet at one end and the cam blank on the end nearest to the headstock. The tool-slide was disengaged from the cross-feed screw and a rope was attached to it. This rope led over a sheave to a heavy weight whose purpose was to hold the templet in contact with the follower in the tailstock spindle. Adjustment for cutting the cam surface was obtained by shifting the tailstock.

Cutting the cam was simple enough. It meant starting the lathe, then slowly revolving the wormwheel. The cam follower, being fixed in position, compelled the tool carriage to move in and out according to the templet contour. If the rotary feed was too fast, the cam surface was scalloped, but when the feed was slow, a fine surface resulted.

Blanks were shaped on a metal-cutting bandsaw, and all other necessary machine work was performed in a lathe.

If steep slopes are necessary on the cam surface, a templet much larger than the final product would be required. In this event, an offset follower would be fastened to the tailstock spindle. The increased size of the templet would ease the slope considerably.

Slotter Toolholder Takes Interchangeable Bits

BY EUGENE P. DWYER

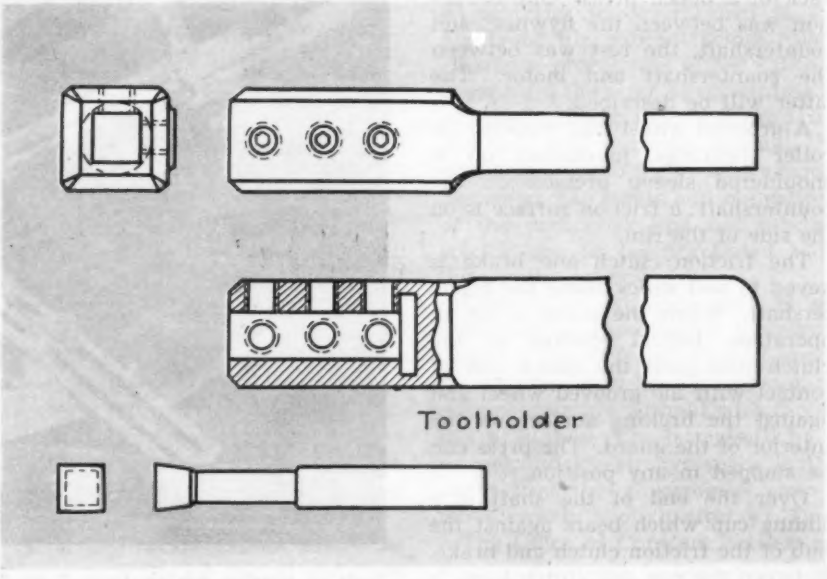
Most slotter tools are forged from bar stock, their cutting edges being ground to suit some special purpose. This design ties up expensive tool steel, most of which is never used for cutting. If work of a different type comes along, either the tool must be reground to a new shape or another made. A less expensive, and more useful, method is to make up a slotter toolholder which uses cutters of comparatively small pieces of tool steel.

A slotter tool holder can be made solid or of two parts welded together. If of two pieces, the head can be counterbored at the base to a diameter larger than the diagonal of the square shank of the cutter and a hole drilled smaller than the distance across the flats; after welding, the square hole can be slotted or broached to a size larger than the shank of the cutter. When of solid construction, the hole is drilled a trifle smaller in diameter than the size of the cutter shank, then a boring tool cuts the diameter of the relief slightly larger than the distance across the corners of the square broached hole. In both cases, setscrew holes must be drilled and tapped on two adjacent sides.

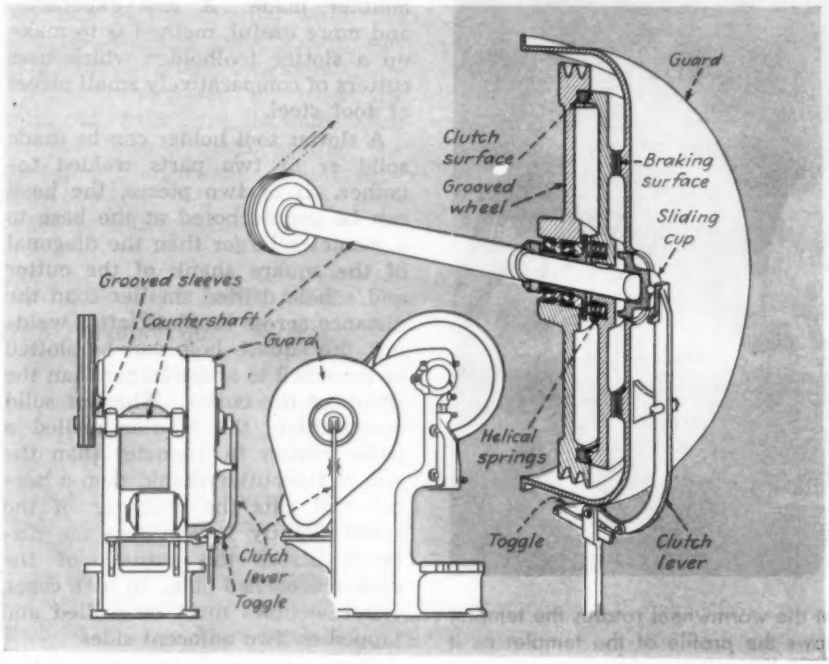
Cutters are made from square tool steel, the length depending upon the depth of the piece to be machined. Many shapes can be mounted in one toolholder.

Square tool steel can be used "as is"; in many instances, only the cutting edges need be ground to cut the contours advantageously. Offset tools can be bent to reach into small spaces. Heavier sections limit tool bending but produce accurate work.

This type of holder is versatile and economical.



Toolholder head and shank can be of two parts welded, or solid, then machined. Cutters of various shapes and sizes can be made to suit conditions



Power Hacksaw Attachment For Accurate Angular Cuts

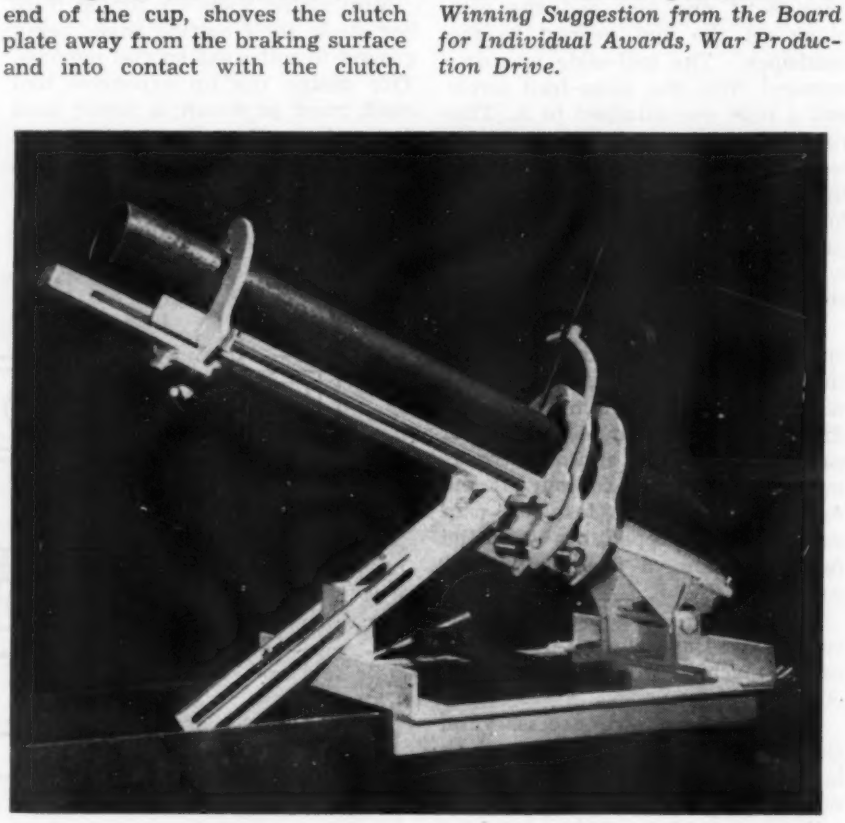
BY EILEF AUSEN

Northrop Aircraft, Inc., Hawthorne, Calif.

Angular cuts in tubing by use of a power hacksaw are seldom accurate, because of the inability to set the stock correctly in the machine. The result is much extra work to correct the error, with wastage of material and loss of labor.

An attachment for holding the material has been made so that it can be placed in exact position to make the correct cut.

The assembly is made of angles and bar stock welded and bolted together. A frame is attached to the hacksaw bed and at the front end is a hinge to which is attached a framework for holding the stock firmly in position. The outer end of this frame is supported by slotted links which are used to adjust and lock this frame in its correct position. The frame also carries several clamps for holding the stock. These clamps can be moved along the frame to various positions. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



Built to receive tubing from 2 to 8 in., this fixture holds the work at the desired angle for cutting off. Material wastage per cut is sharply reduced with this set-up as compared with tubing held in a vise

Bench Press Slowed For Forming Operations

BY PETER KETELSEN

Tool Engineer, Boeing Airplane Company, Wichita Division

Small punch presses are usually driven from a lineshaft or motor, resulting in rapid production. Forming metals requires slower action, necessitating a larger speed reduction between the power source and press.

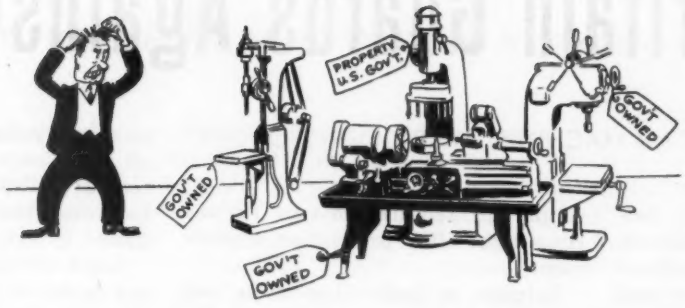
To reduce the speed enough, a countershaft was mounted on the back of a bench press. One reduction was between the flywheel and countershaft, the rest was between the countershaft and motor. The latter will be described.

A grooved wheel was mounted on roller bearings journalled on a shouldered sleeve pressed on the countershaft; a friction surface is on the side of the rim.

The friction clutch and brake is keyed to and slides along the countershaft. When the press is not in operation, helical springs in the clutch hub push the clutch out of contact with the grooved wheel and against the braking surface on the interior of the guard. The press can be stopped in any position.

Over the end of the shaft is a sliding cup which bears against the hub of the friction clutch and brake. Between the cup and clutch lever is a steel ball which acts as a universal bearing. The clutch lever is mounted on the outside of the guard and is actuated by a treadle through a toggle under the guard.

Stepping on the treadle straightens the toggle and forces the clutch lever against the steel ball on the end of the cup, shoves the clutch plate away from the braking surface and into contact with the clutch.



Attention to government directives might save much hair-pulling when owners seek the removal of government-owned equipment from their plants

Contractors Can Speed Plant Clearance

ALTHOUGH prompt removal of government-owned machinery and equipment after VE-Day has been of great concern to many war contractors, there is little question but that each contractor can materially speed up the clearance of his plant by promptly taking the steps outlined by various government directives. Moreover, if he neglects taking the proper action, he may cause prolonged delay in the clearance of his plant.

While the Contract Settlement Act and the Surplus Property Act provided for the removal of termination inventories within a 60-day period, Regulation No. 4 of the Office of Contract Settlement outlines the steps by which the contractor can either bid for the purchase of government-owned equipment in his plant or request its removal.

When a contractor no longer feels that he needs any equipment in his plant for the performance of a war contract, he should promptly notify the owning agency whether or not he wishes to exercise his option to buy or lease the machine, or is willing to waive such option. If he wishes to exercise his option and the owning agency determines that the option is operative, then an agreement will be made accordingly.

If there is no option on the equipment, or the contractor does not choose to exercise the option, the contractor should submit to the owning agency promptly:

1. An itemized list of the plant equipment, indicating the items to be retained, and the ones which must be removed to make room for other production (such production should be described);

2. A statement of the amount of space that can be made available in his plant or nearby for temporary storage of such equipment; and

3. A statement of whether the contractor can use his own labor to dismantle and prepare the equipment for removal and shipment, or intends to use outside contractors.

Unless the owning agency notifies the war contractor within 10 days of its receipt of the list and data that the list is unsatisfactory, then the agency must within the next 20 days after receiving the list notify the war contractor: (a) Whether any plant equipment on his list has been determined by the government to be necessary for war production; (b) whether the government is willing to dispose of any items which the contractor wishes to buy; and (c) whether the contractor is requested to store it in available space in his plant, or dismantle and prepare it for removal and shipment.

In all cases, the contractor is to be furnished with specifications, as standardized as possible, regarding methods of storage, or preparation for removal and shipment.

Within 60 days after the agency's receipt of the contractor's list, the government must dispose of whatever plant equipment it is willing to release for purchase by the contractor, advise the contractor of what items he is to store in available space and instruct him on items to be removed by or on behalf of the government.

OCS appreciates that under some existing facilities contracts, no indication may be given as to who is to bear the cost of dismantling, removal, or storage. Such matters are to be left to negotiation between the contractor and the owning agency.

If a contractor cannot afford to wait out the 60-day period and must clear his plant immediately, he may remove government-owned machinery and store it at his own expense and risk. But he must notify the owning agency of such action.

An important fact to be noted by contractors who desire speedy plant clearance, is that where the government has not removed the equipment from his plant within 60 days, he must give the owning agency 20 days notice of his intention to remove these items and store them at the expense and risk of the government. To protect himself against possible waste of 20 days' time, the contractor should notify the owning agency of his intention of taking the removal step 20 days before the end of the 60-day over-all time limit, instead of waiting until the 60 days are over.

Unless specifically provided by facilities contracts, the government will not recompense the contractor for expenses in restoring, rehabilitating or reconverting his plants.

In cases where a contractor has permitted certain government-owned facilities to be installed in the plants of his subcontractors, plant clearance procedures of the subcontractor are the same as those already outlined, except that the sub's list and data will be routed through the war contractor to the owning agency Moreover, the rights and obligations of the contractor and his subcontractor are to be negotiated with the owning agency.

Contractors who are able to set aside storage space within their own plants or property, should such space be required, may have an advantage over contractors without such facilities available. The latter will have to seek outside storage space in the event that the government cannot move swiftly enough after VE-Day.

The Office of Contract Settlement urges contractors to plan ahead for plant clearance and try to work out a time schedule for the most urgently needed space in their plants.

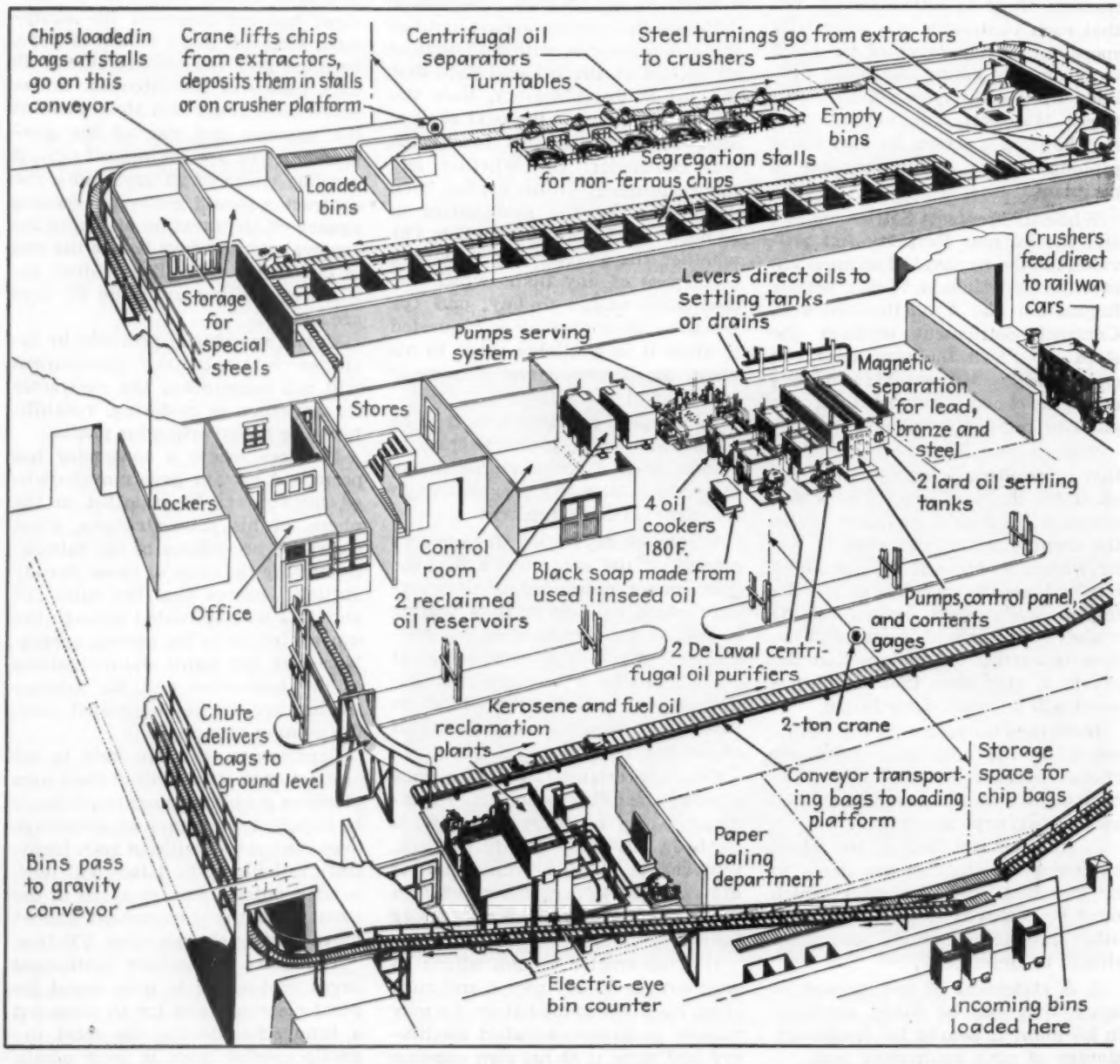
Britain Guards Against Waste

BY W. J. HARGEST, AMERICAN MACHINIST WAR CORRESPONDENT

BRITISH AIRCRAFT engine factories waste little or no aluminum. All chips, machine turnings, machine shop rejects, foundry residues and skimmings, and damaged and obsolete engines are remelted. Secondary aluminum thus reclaimed is used in casting new engine parts. This aluminum meets rigid specifications, and that reclaimed by Rolls-Royce is of such quality that it is used to supply all requirements of its various light-alloy production departments.

Salvage of light-alloy chips and turnings, is conducted by Rolls-Royce in conjunction with the salvage of steel chips, lead, bronze, metallic sodium, oil coolants, motor oil and cleaning compounds. Motor oil impregnated with gasoline, obtained from engine test dynamometers, is reclaimed and used as fuel oil. All such salvage is done in a central building at the Rolls-Royce factories, the layout of which is shown in the accompanying drawing.

Light-alloy, steel and bronze chips are deposited in large leakproof bins placed at specific locations in the machine shops. They are painted with a color band to identify the type of metal deposited in them, thus segregating the chips at the source of supply. In the case of light alloys, this prevents contami-


Chips loaded in bags at stalls go on this conveyor
Crane lifts chips from extractors, deposits them in stalls or on crusher platform
Centrifugal oil separators
Turntables
Steel turnings go from extractors to crushers
Empty bins
Segregation stalls for non-ferrous chips
Loaded bins
Storage for special steels
Crushers feed direct to railway cars
Levers direct oils to settling tanks or drains
Pumps serving system
Magnetic separation for lead, bronze and steel
Stores
2 lard oil settling tanks
Lockers
4 oil cookers 180 F.
Control room
Black soap made from used linseed oil
Office
2 reclaimed oil reservoirs
Pumps, control panel, and contents gages
2 De Laval centrifugal oil purifiers
Kerosene and fuel oil reclamation plants
2-ton crane
Chute delivers bags to ground level
Storage space for chip bags
Conveyor transporting bags to loading platform
Paper baling department
Bins pass to gravity conveyor
Electric-eye bin counter
Incoming bins loaded here

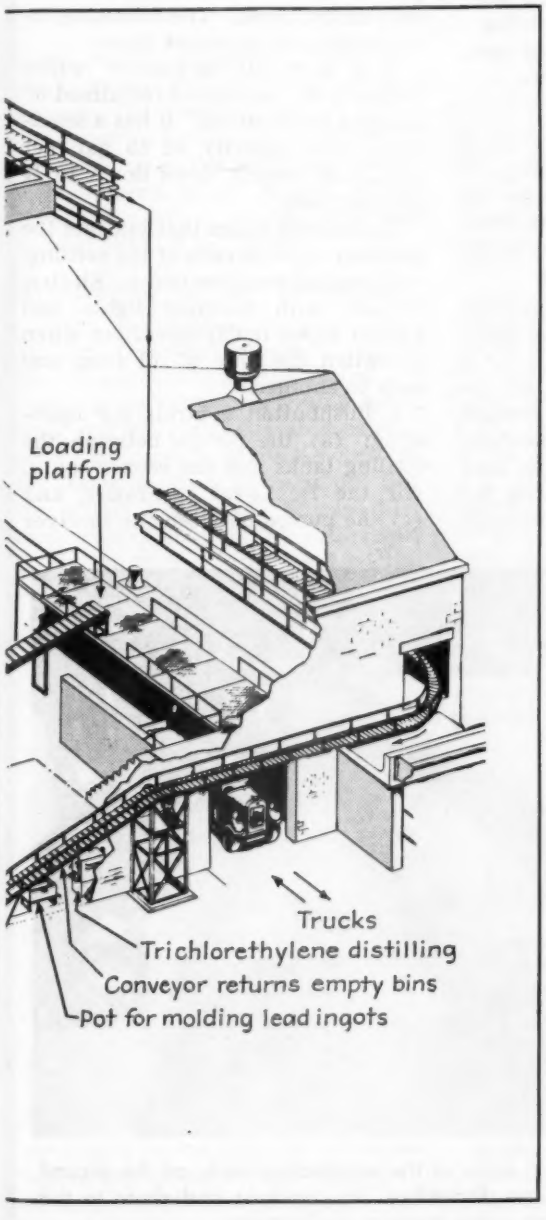
A central chip and oil reclamation plant erected by Rolls-Royce is equipped to salvage metals, coolants,

Typical of large aircraft engine plants Rolls-Royce has installed centralized oil and chip salvage facilities. Chip handling is conveyorized and oil reclamation is operated from a single panel

nation in later handling and remelting.

The bins are fitted with skids, casters and an angle iron along two sides at the top. When rolled into the body of a trailer truck, the angle irons are directly above angle-iron struts welded to two longitudinal beams running between the front and rear end sills of the trailer. There is space for six bins on the trailer. When they are in place, the end sills are raised hydraulically, lifting the bins from the floor. They are thus transported to the central salvage department, being hauled by a truck powered with a gasoline engine.

Arriving outside the salvage building, the bins are pushed by hand to a power-driven conveyor which carries them to second-floor height. Near the top of this conveyor is a photo-electric cell relay that automatically counts the bins entering the building. The power-driven conveyor delivers the bins to a gravity roller conveyor on which they travel to turntables immediately in front of centrifugal oil extractors.



The bins are tipped mechanically, and the contents are raked into the extractors by hand. The empty bins continue on the gravity conveyor to ground level outside the building and are deposited adjacent to the loading station ready for redistribution throughout the factory.

As shown in the layout of the salvage department, there are seven oil extractors. After the coolant is extracted, the baskets are lifted by an overhead one-ton crane and the chips, which retain less than two percent moisture by weight, are deposited in segregation stalls. There are 18 such stalls, 16 of them being at the opposite side of the bay from the extractors. Each stall is identified by the color for the particular metal or alloy to be stored.

Steel chips are placed in one of two segregation stalls at the end of the bay where they are examined for solid pieces of scrap. When these are removed, the chips are transported to crushers installed over a railway siding so that the crushed chips and turnings can be fed directly into freight cars. Two chip crushers are in operation: (1) a hand-fed 24-in. unit with an output of one ton an hour, and (2) a 36-in. unit with an output of two tons an hour that is fed by a mechanical conveyor.

Non-ferrous chips are deposited after oil extraction in the 16 stalls opposite the extractors. The chips are bagged, labeled and dispatched on a power-driven conveyor running in front of the stalls. This delivers the sacks to a gravity conveyor, from which they enter a chute and are dropped to another power conveyor on the ground floor. This traverses the length of the building and carries the sacks either to a storage area or to a loading platform from where they are loaded in freight cars or trucks for delivery to various destinations.

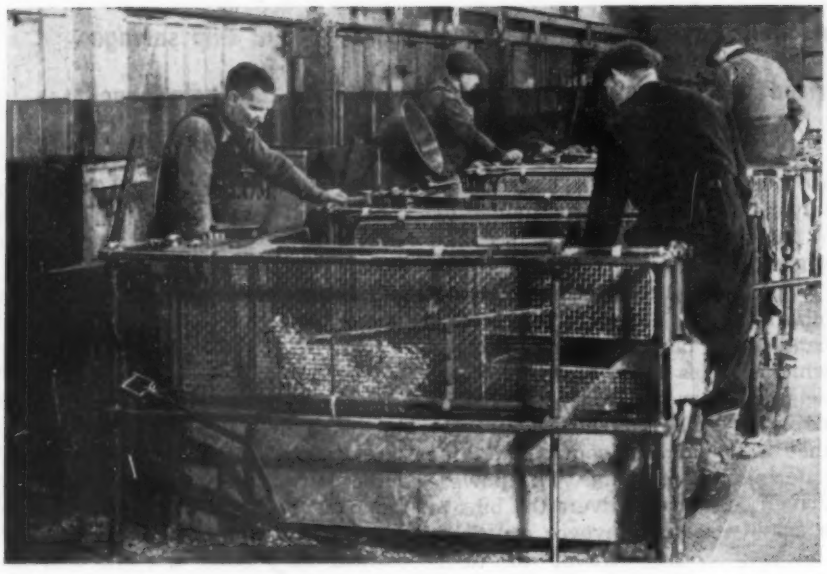
Magnetic Separator Used

Light alloy chips are sent to the metals reclamation department where they are remelted and cast into ingots. On arrival at this department the sacked chips are weighed and stacked in ½-ton lots ready for passing the chips over a magnetic double-drum separator for extraction of iron and steel particles. This is necessary in spite of previous care taken during hand separation at the segregation stalls—cutting tool rubbings, broken tools, broken gages, small nuts and bolts, and miscellaneous iron and steel particles must be removed. All chips are screened before passing over the magnetic separator. Those that pass through ⅛-in. mesh are fed into a rotary drier to remove oil remaining after centrifuging. The chips drop from the drier into a pneumatic elevator that carries them to the magnetic separator. It has been found that better separation results when chips of this size are dry. These are then briquetted.

Large chips passing over the separator fall on a belt conveyor that transfers each batch into storage hoppers above melting furnaces. Four ploughs push the chips into the appropriate hopper.

Briquetting is a prerequisite to melting light alloy chips below ⅛-in. mesh size. This is essential because small chips dropped directly into the furnaces incur high melting

fuel oils and cleaning compounds



Bins are stopped on turntables in front of centrifuges, and are tipped mechanically. Chips are raked by hand into the oil extractors. After centrifuging, the chips contain less than two percent moisture by weight, and are deposited in stalls for hand separation of large ferrous particles

losses, despite melting under a flux cover. This is because of the ease with which small particles either oxidize or float on the surface of the flux.

Briquettes are made in a 400-ton toggle press, two briquettes being produced at each stroke of the ram. At ten strokes a minute, hourly production is 1,200 briquettes. These are 3-in. diameter and 1-in. long. The chips drop into two molds from a reciprocating feed box that is filled from two chutes leading from a storage hopper. After two briquettes have been ejected from the press, the lower rams drop back to the bottom of the molds, and the feed box passes over them, depositing chips for the next stroke.

Density of the briquettes is subject to slight variation; however, it averages 97 percent of solid aluminum, which is higher than the density of molten aluminum. Such high density is essential; otherwise, the briquettes would not settle in the molten bath when remelting, and high melting losses would result.

Settling Tanks for Lard Oil

Lard oil coolants, removed from chips by the centrifugal extractors at the salvage center, run into one of two settling tanks of 1,500 gal. capacity on the ground floor directly beneath the extractors. A two-way valve in the feed line directs the oil into one tank while heavy sludge, consisting of fine chips, dirt and water, settles in the other tank. The oil is allowed to settle for six hours, and is heated to 100 F. by high-pressure hot-water coils to increase the rating of settling. A magnetic filter in each tank removes ferrous particles which may be in the oil.

The oil after settling is pumped to one of four open-top heater tanks of 400 gal. capacity. Here it is "cooked" at 180 F. for four or five hours, evaporating the water content and killing bacteria. Remaining heavy impurities fall to the tank bottom as sludge. After cooking, the oil is clarified by passing it through De Laval centrifugal separators, which retain solid impurities and small amounts of water in bowl and discharges the oil through two magnetic filters in parallel into two receiver tanks of 1,000 gal. capacity each. The oil is clarified rather than purified because there is insufficient water in the oil after initial settling operations to warrant the use of the much slower process of purification. Three De Laval separators are used —two for lard oil reclamation and one for fuel oil. The reclaimed oil is finally pumped from the receiver tanks through a strainer to oil storage tanks from where it is pumped directly to machine tools in the various departments.

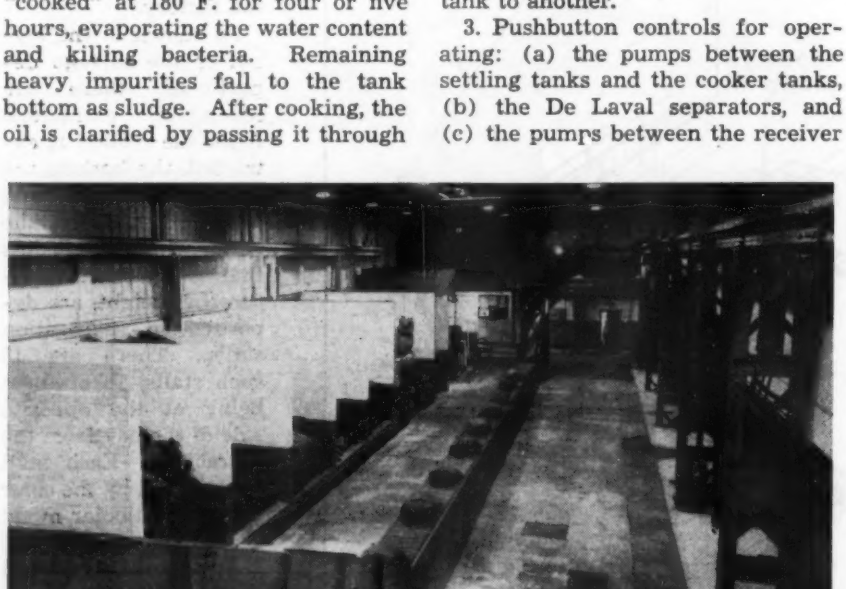
Instruments for Lard Oil

The entire lard-oil reclamation process is controlled from a master instrument panel. The following instruments are mounted there:

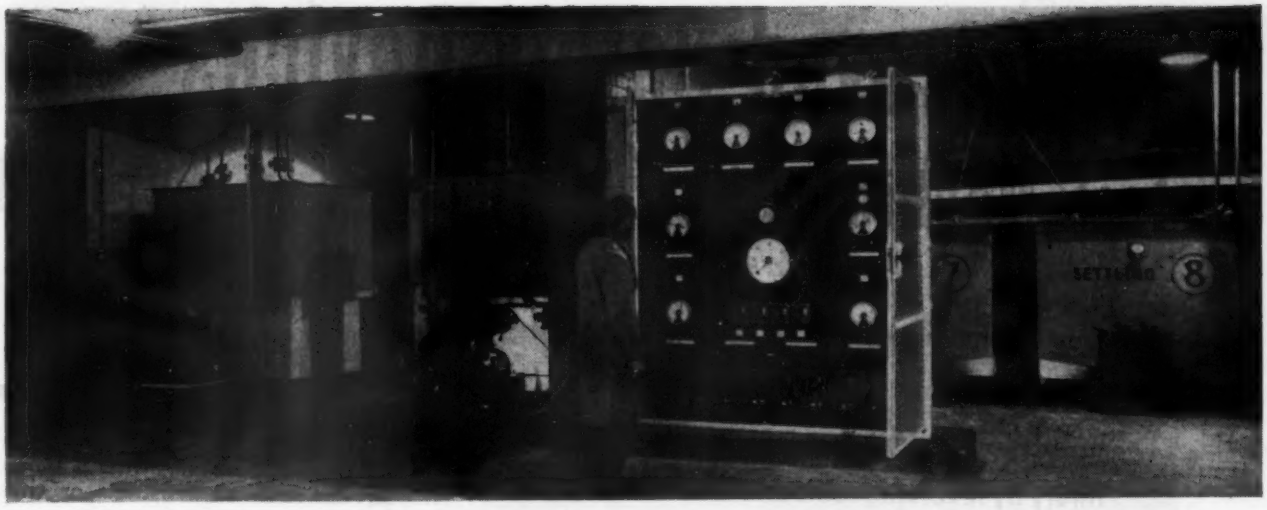
1. A lard oil flowmeter which registers the amount of reclaimed oil pumped to oil stores. It has a maximum flow capacity of 35 gal. per min., and records flows down to ⅛ gal. per min.

2. Contents gages that indicate the quantity of oil in each of the settling, cooking and receiver tanks. Electric circuits with warning lights and klaxon horns notify operators when to switch the flow of oil from one tank to another.

3. Pushbutton controls for operating: (a) the pumps between the settling tanks and the cooker tanks, (b) the De Laval separators, and (c) the pumps between the receiver



Aluminum chips are packed in sacks at the segregation stalls on the second floor of the building. They are dispatched via conveyor and chute to the first floor for either storage or shipment



Instrument panels are installed for the oil salvage units. Flowmeters gage quantities of oil reclaimed. Contents gages, interlocked with warning lights and klaxons, tell when to switch flow from one tank to another. Pushbutton motor controls for the pumps are also mounted here

tanks and the oil stores. There is a reset button for the klaxons and warning light relays.

The entire system for reclamation of lard oil is so designed that should a breakdown occur in one set of pumps, the other set can carry the normal load of the plant.

Automotive Oil and Kerosene

Used automotive oil and dirty gasoline from the sumps at engine test dynamometers are treated by cleaning the oil and removing gasoline, and the residue is used as fuel oil. The process of reclamation is the same as that for lard oil, but the layout is different. The location and arrangement of the equipment is shown in the foreground of the accompanying plant layout.

The sequence of fuel-oil reclamation is as follows:

1. Dirty oil is pumped from storage tanks to settling tanks.
2. Settling tanks feed into cooker tanks by gravity.
3. Cooker tanks feed to a De Laval separator by gravity.
4. The De Laval separator uses its own built-in pump to feed the fuel oil to a reservoir tank.
5. The receiver tank feeds the oil to a service station by gravity.

Aircraft engine parts and other metal products as received by assembly departments from shipping centers or storage are generally covered with grease or oil as protection against corrosion. These are cleaned with kerosene, which after use is sent to the chip and oil reclamation center for salvage. The dirty oil is pumped from a central receiver station to one of four settling tanks mounted above a refining still. Four settling tanks are used, since three are required for undisturbed oil settling while the fourth is filling. After settling, the oil flows from any one of the four tanks through a strainer and geared pump into one of two tanks in the refining still.

This still is self-contained and automatically controlled. It raises the temperature of the dirty kerosene to the boiling point, the pure vapor being boiled off and distilled, while the residue waste oil and grease is salvaged directly from the still. The distilled kerosene is passed through fuller's earth to remove offensive vapors and discoloration, both of these being due to impurities not removed by the still.

Both processes, that is, the fuel oil and kerosene recovery, are controlled from instrument panels housing tank-contents gages, flowmeters, warning lights and signals, and pushbutton controls for motors and pumps.

Between the coolant oil reclamation department and the wall adjacent to the railroad siding shown on the plant layout is space devoted to the separation of lead-bronze and steel, and to the salvage of metallic sodium from the stems of aircraft engine exhaust valves. Lead bronze and steel scrap is fed to a steel pulverizer, the delivery end of which is connected to a shake-type chute which spreads the pulverized steel and lead bronze evenly over the feeder tray of a magnetic separator. The segregated lead bronze and steel is collected from the separator by different outlets and sacked prior to storage and sale.

Average Weekly Total of Reclaimed Products

Mixed steel chips, tons	190
High-speed steel scrap, tons	9
Phosphor-bronze chips, tons	22
Mixed light iron scrap, tons	17
Miscellaneous steel scrap, tons	66
Aluminum alloy sweepings	10
Aluminum alloy chips	110
Waste paper, tons	11
Special steels, tons	14
Reclaimed lard (cutting) oil, gal	6,400
Oil reclaimed as fuel, gal	4,500

Sodium Handled With Care

The salvaging of metallic sodium from aircraft engine valve stems is a dangerous operation, since the sodium reacts violently with water or moisture, generating heat and discharging free oxygen. Therefore, the valve stems are kept completely free of moisture until they can be "drowned" in a water bath which has sufficient capacity to dampen any explosion and absorb the heat liberated.

The valve stems are cut off in a hand press and inserted upright in wire baskets. These are plunged into water tanks of 1,000 gal. capacity. The baskets are fitted with safety covers that close automatically the instant the cut valve stems are immersed. The immersion tanks are located outside the building for safety reasons, an opening being cut through the wall for the passage of the baskets into the water. Electrolytic separation of the water and sodium is a final operation.

Improved Safety Devices

Curtail Machine Shop Accidents in England

Eight-point safety program is sponsored in British factories to protect workers against injury by revolving tools and machine parts. Novel machine guards have been installed

AMERICAN ENGINEERS visiting machine shops in British factories are likely to notice first the preponderance of guards used on machine tools. This is particularly true because some of the guards employed are not only novel in design but also unknown in the United States.

One is inclined to believe that the British safety engineer has "leaned over backward" in furnishing protective devices for the workmen. This impression is changed as soon as all the factors involved are analyzed.

At the beginning of the war, large numbers of men and women without any factory experience were inducted into jobs in machine shops by the Ministry of Labor. The urgency of attaining maximum production in minimum time found many of these workers assigned immediately to machine tools, and they received their operational and safety training on the production line. At that time, personal initiative and enthusiasm was at the highest pitch because of patriotic fervor. Such conditions, quite naturally, were not compatible with high safety records. Factory blackouts, necessitating changes in illumination practices, added to the problem. Finally, the majority of British factory workers are paid by piecework or premium systems, and the incentive for higher pay by increasing individual production was frequently a contributing factor to accidents.

It soon became a matter of great urgency for the government to advocate the adoption of improved safety devices. Many companies designed their own guards for specific jobs, while other companies marketed standard guards of diverse design. The Factory Department of the Ministry of Labor and National Service soon started a campaign for the adoption of safety guards throughout British factories. To enhance this program, bulletins, posters and booklets describing both the type of devices and the necessity for their application were distributed everywhere.

The present safety program of the Ministry of Labor and National Service involves the following factors:

1. Machine operators are instructed about the risks involved in running machines, and are taught to work safely.

2. Young employees, presumably those under 18 years of age, are now required by law to have proper safety training.

3. Special attention is given to piecework operators whose desire to earn higher pay often leads to disregard of safety precautions.

4. Safety devices are advocated on machines to prevent belts from creeping onto fast pulleys.

5. Recommendations are made for keeping floors around machines in good condition, properly drained, and free from loose articles or greasy substances.

6. Special attention is paid to wearing apparel, and emphasis is placed on the danger of loose clothing and the wearing of jewelry; also, for women workers, stress is placed on the need of hair nets or caps, low-heeled shoes, and the use of slacks instead of skirts.

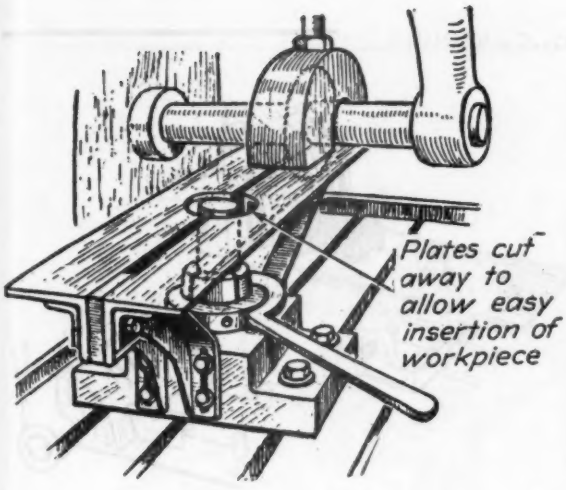
7. Every effort is made to provide proper illumination, and to eliminate glare that tends to cause accidents. Machine operators are taught to arrange properly individual lighting units at machines.

8. Secure guarding is advocated as the most important precaution of all.

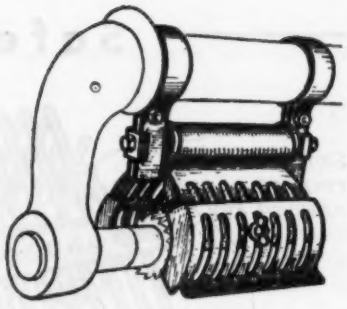
To emphasize the stress which the British place on this safety factor, the following paragraph is quoted from a recent British safety bulletin, describing guards for milling machine cutters:

"If badly adjusted, a guard may be of no use whatever and the more effective use of guards is imperatively needed Every guard should be adjusted to give its best service. Improvement in guard design is also required. Automatically operated guards are of particular value and can be applied very readily to repetitive work on which the bulk of accidents occur. Flat plates or 'false tables,' and specially designed fixtures can all help toward securing the maximum enclosure of the cutters, a purpose every guard should be designed to fulfill."

From the beginning of the war, special attention was paid to guards for revolving milling cutters. In 1938, the yearly total of accidents caused by revolving cutters on horizontal milling machines was 549. This increased to over 1,000 in 1941. Officials of the Ministry of Labor and National Service studied the circumstances of these accidents, and summarized the causes. Over 90 percent of the accidents occurred in connection with repetitive jobs and early efforts were made to standardize protection for work in this category. Later, guards were designed for all classes of work.



False tables are used extensively. They usually consist of two angles secured to the fixture. The cutter revolves in a slot between the plates and is never exposed during normal operation. A flat surface of any desired width or length can be provided to which the cutter guard can be adjusted



It is recommended that the cutter periphery guard be adjusted as closely as possible to the cutters with the flanges of the guard deep enough to cover the teeth at the sides of the cutter

SUMMARY OF ACCIDENT SURVEY ON HORIZONTAL MILLING MACHINES

WORK BEING DONE AT TIME OF ACCIDENT	PROPORTION OF ACCIDENTS	SPECIAL CONTRIBUTORY FACTORS
Removing, inserting or adjusting the workpiece...	60%	1. Cutter not stopped. 2. Job not withdrawn to a safe distance. 3. Shape of work-holder or fixture preventing close adjustment of the guard. 4. Work-holder or fixture locking devices placed in a dangerous position. 5. Exposure of cutter below guard.
Removing chips.....	15%	1. Cutter not stopped. 2. Suitable brush or other appliance not available or used.
Adjusting coolant pipes.....	7%	1. Cutter not stopped. 2. Exposure of cutter below guard. 3. Suitable facilities not provided to clear or adjust coolant pipes in safety.
Cleaning with rag.....	5%	1. Cutter not stopped. 2. Unsafe practice of using rag near moving machine parts.
General work at machine—falls.....	5%	1. Floor not kept in good level condition. 2. Floor not free of loose objects. 3. Floor slippery.
Gaging.....	3%	1. Cutter not stopped. 2. Job not withdrawn to a safe distance.
Miscellaneous.....	5%	1. See NOTE below.

NOTE: There were general contributory factors to accidents recorded in the summary. Such factors were specifically responsible for the 5 percent of total accidents listed under "Miscellaneous." These contributory factors are:

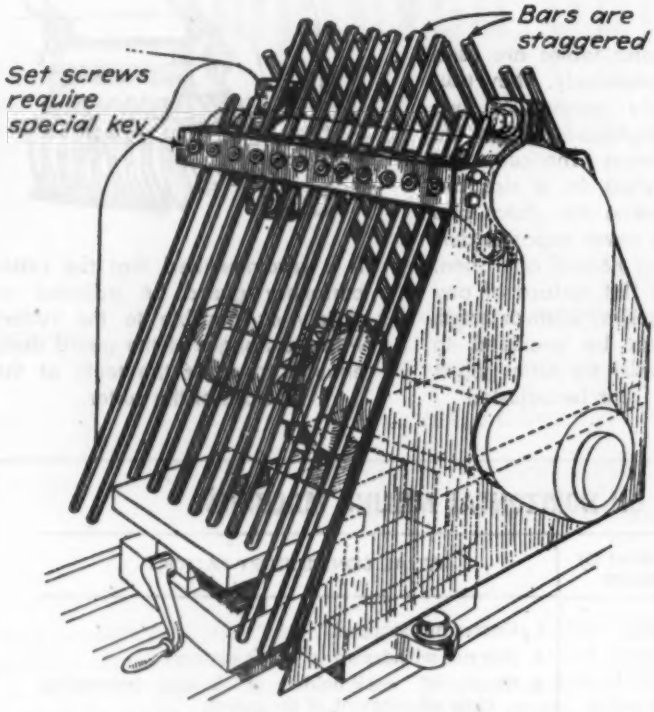
1. Guarding irregularities, including no guard used, ineffective guard used, and good guard used but badly adjusted.

2. Loose clothing—sleeves, woolen garments, gloves and bandages—catching on cutters.

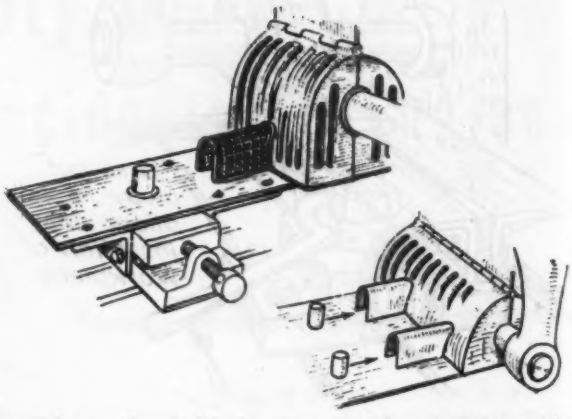
3. Bad lighting resulting from poor illumination or glare.

4. Inefficient striking gear on belt-driven machines which permitted belt to creep onto fast pulleys and accidently starting cutters.

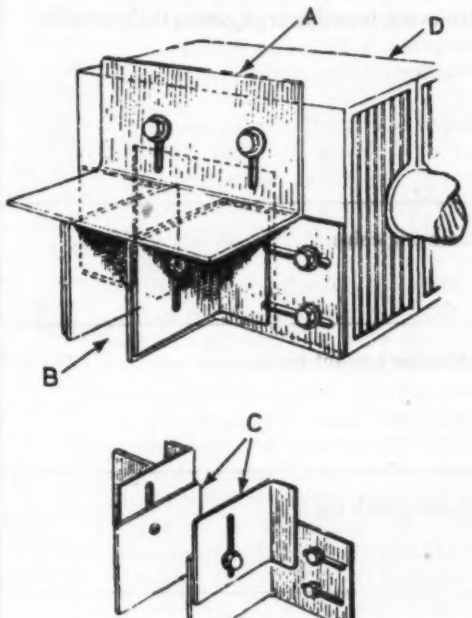
5. Incentive to earn high wages by piecework operators, which tended to cause disregard of safety precautions.



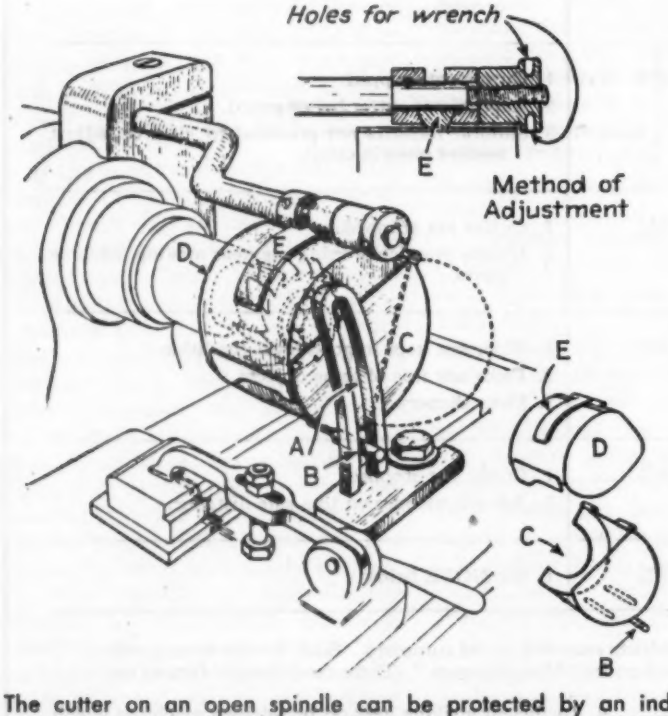
A series of inclined steel rods are adjusted by a special key. The key is retained by the tool setter after setting the rods to the proper working position. The close spacing of the rods and heavy end guard are effective in keeping hands away from the cutter



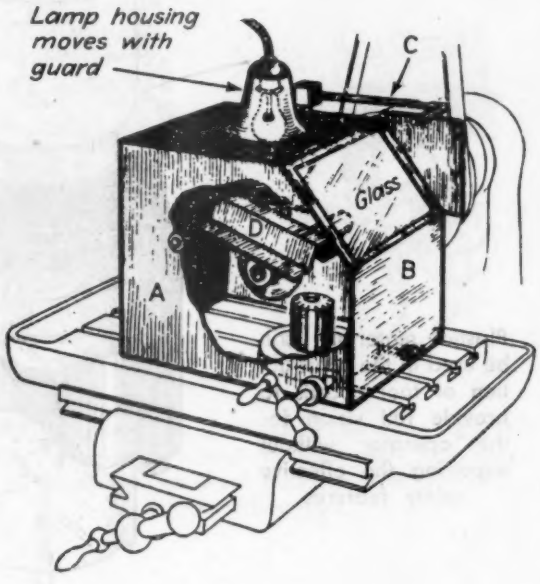
Tunnel guards of this type are used with false tables when it is not possible to have the work below or flush with its top. Ordinarily, an unprotected opening would be left and the cutter would be easily accessible. This danger is avoided by a tunnel of suitable size and length



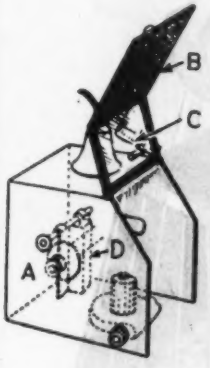
Tunnel guards made up of slotted angle segments can be adjusted vertically and horizontally to fit different part sizes. The completely assembled guard *A* forms opening *B* for work clearance during table traverse. During assembly, angle plates *C* are adjusted for work clearance and are bolted to cage *D* that surrounds the cutter



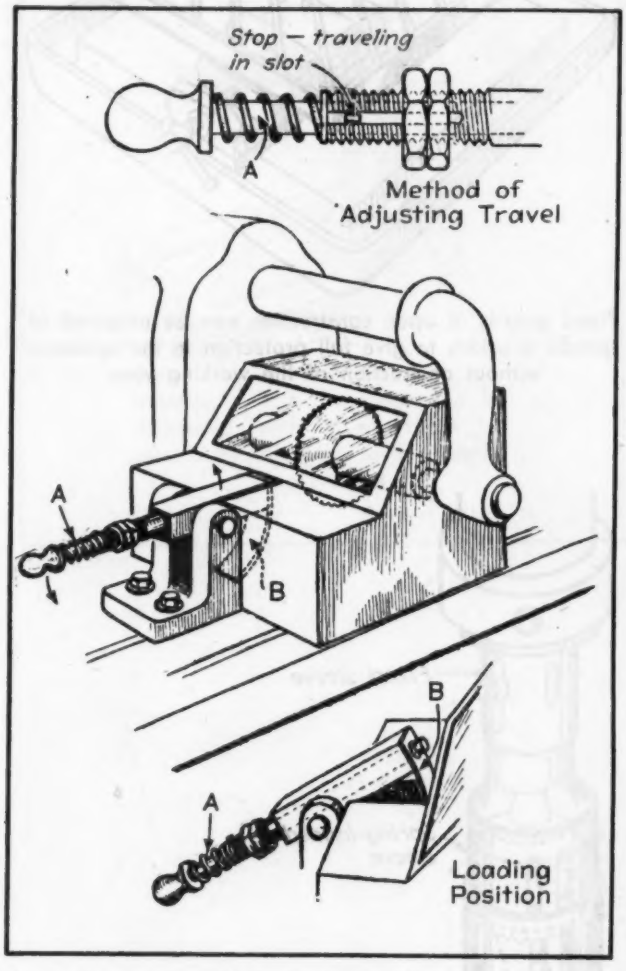
The cutter on an open spindle can be protected by an individually suspended automatic guard. Slotted bar *A* is fixed to the table. Pin *B* fixed to lower hinged part C of the guard, moves in slot *A*. When the job is moved to the cutter, cover C opens. The guard cannot be opened when the workpiece is away from the cutter. Upper part *D* of the guard can be adjusted to regulate the height of opening. Bevelled rib *E* is clamped between two jaws, which can be opened when adjustment is required



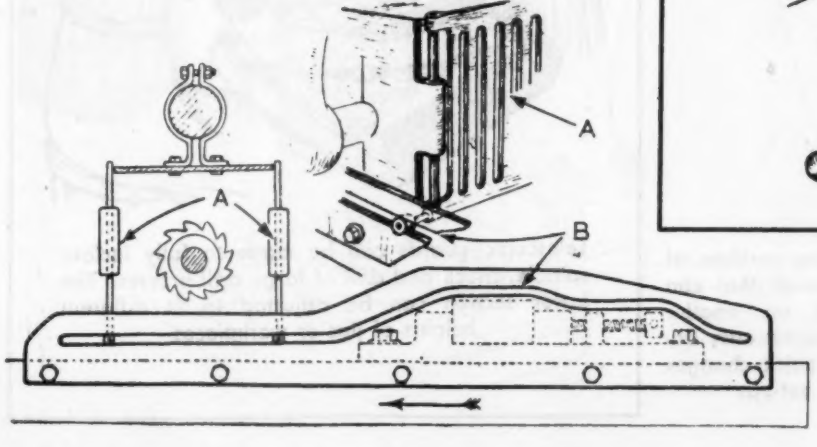
Screw heads are slotted in this arrangement, in which a fixed guard incloses the cutter at all times. The screw is clamped in a recess at the end of the rod *A* which is then swung downwards to a horizontal position. The rod is pushed forward against the pressure of a light spring, the depth of the cut being regulated as shown in the plan view. Curved plate *B* covers the gap in the guard when screws are being unloaded and loaded

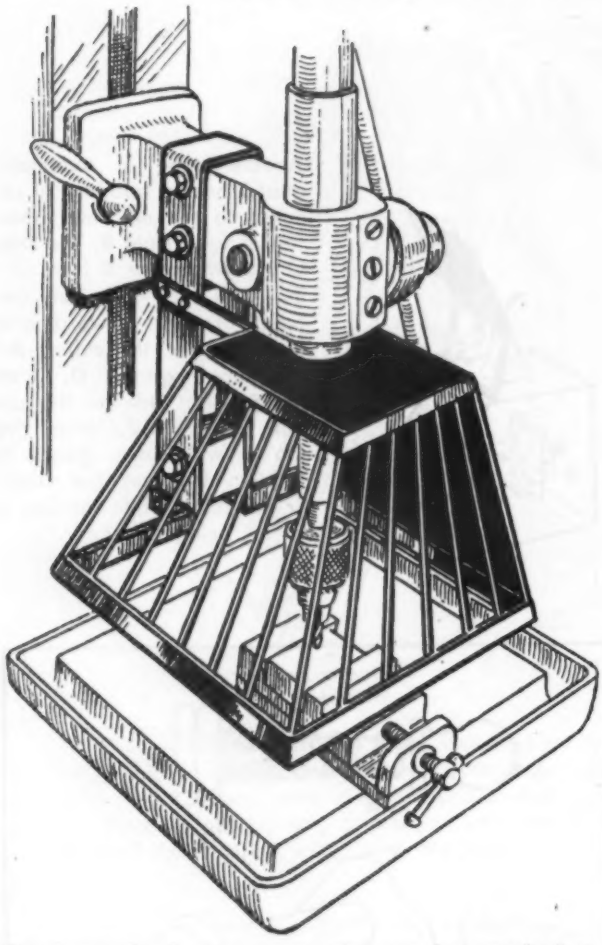


Another type of automatic guard has a housing *A* secured to the machine table, and hinged front *B*. The stop *C* prevents cover *B* from lifting until the workpiece has been brought forward and well clear of the cutter. An additional guard *D*, with flanges that ride on the arbor, is provided. When the job is withdrawn, guard *D* falls in front of the cutter to protect it while the job is being changed



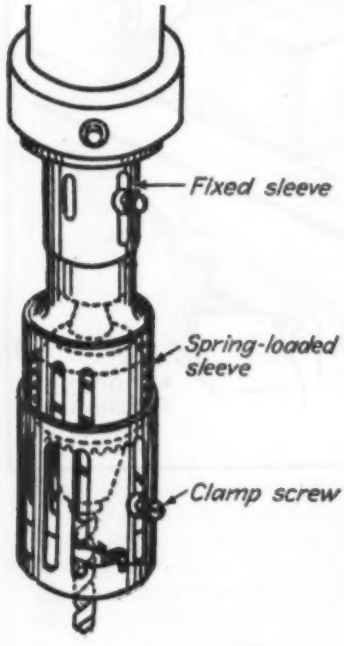
Follower cam-operated lift screens can be used to accommodate work that is too bulky to permit effective use of other types. Positive movement of screens *A* in both directions is obtained by using closed cam track *B* which also prevents the screen being lifted by hand. The screens can be made to open or close at predetermined points to clear the job or fixture by designing suitable cam tracks



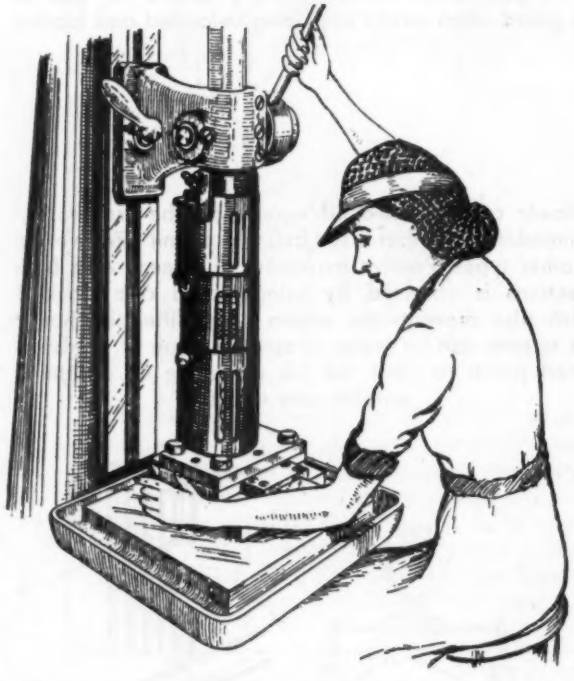


Fixed guards of open construction can be attached to spindle brackets to give full protection to the operator without obstruction of the working view

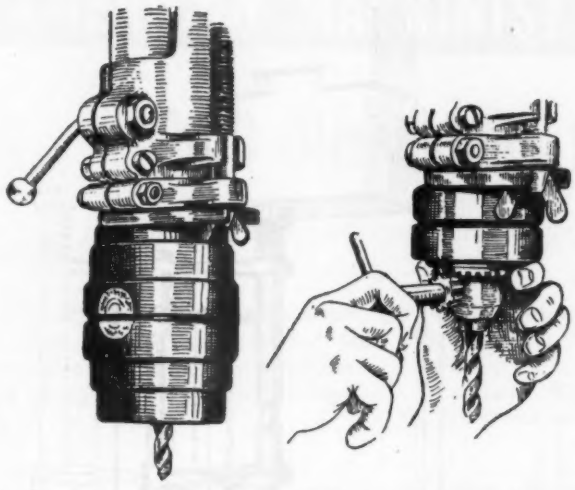
Plastic materials can be used in the construction of tool guards to provide full vision for the operator without impairing the effective safety features



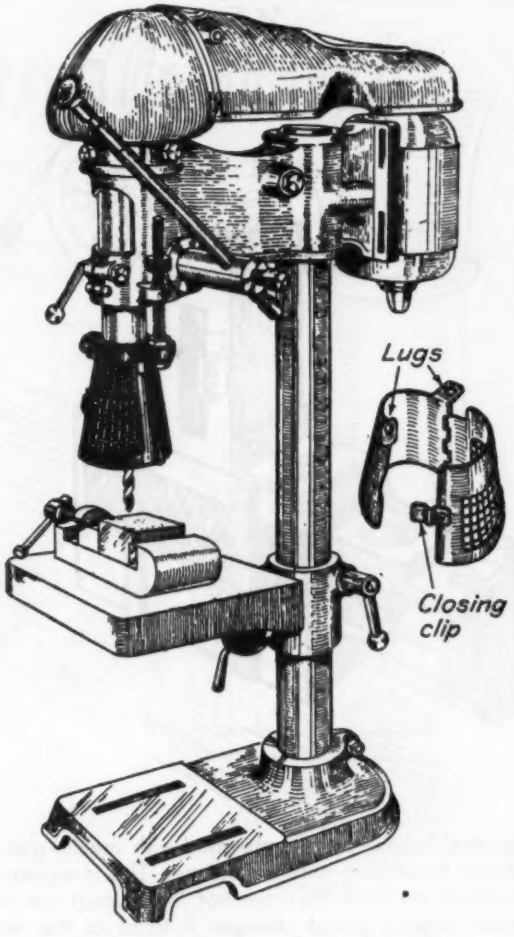
Telescoping sections of chuck guards that can be used on smaller presses permit easy access for quick changes in set-ups



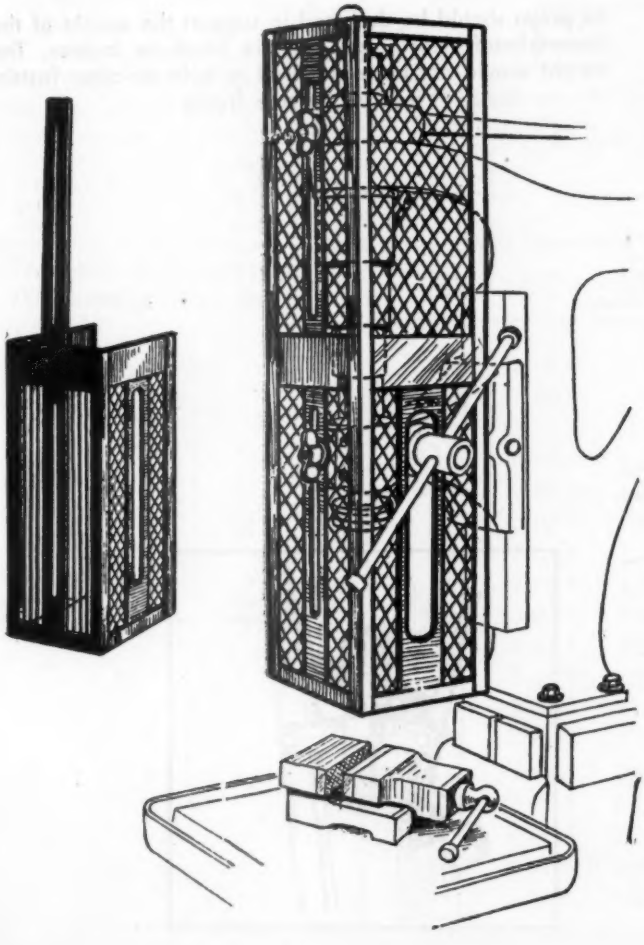
Telescopic guards can be made to fully inclose spindle, chuck and drill of large drill presses. The lower section can be adjusted to fit different heights of jigs or workpieces



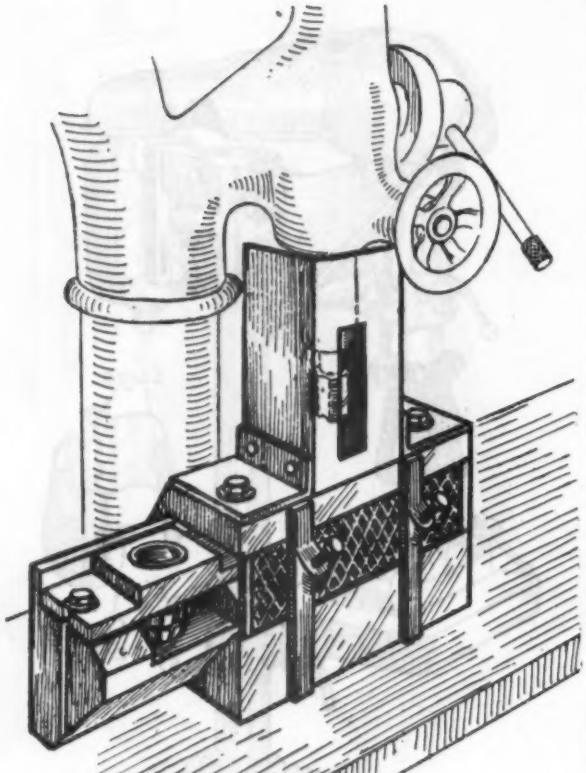
A telescoping guard has a fitting at the rear for attachment of an air hose used to clear chips from the surface of the work. The chuck guard aids in directing the airflow efficiently



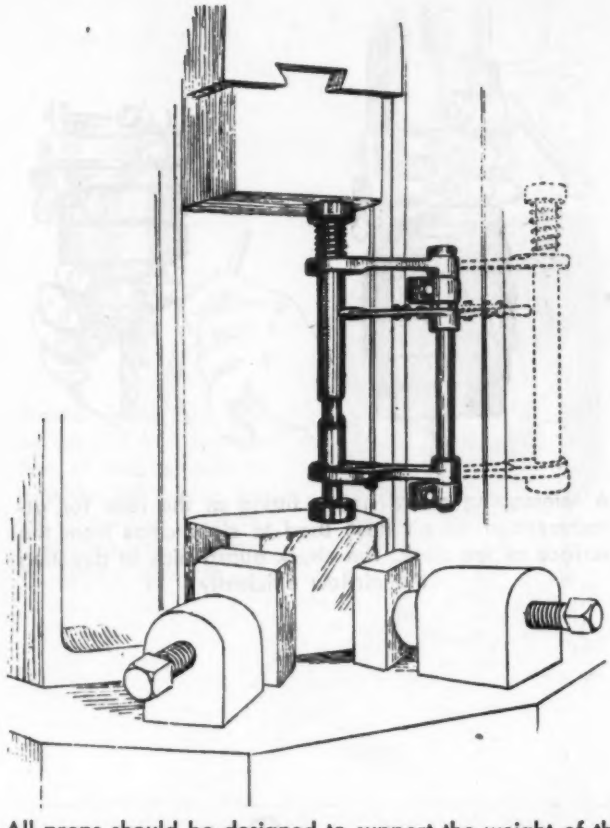
Smaller drilling machines can be equipped with fixed types of guards by attaching to the spindle stop bracket



A full column type of guard can be used to protect pulleys, spindle and chuck of large floor presses. The lower section telescopes to permit easy access to the spindle for tool changes

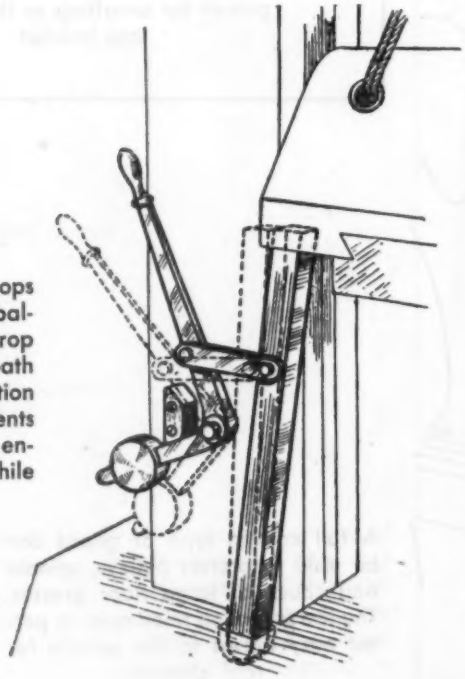


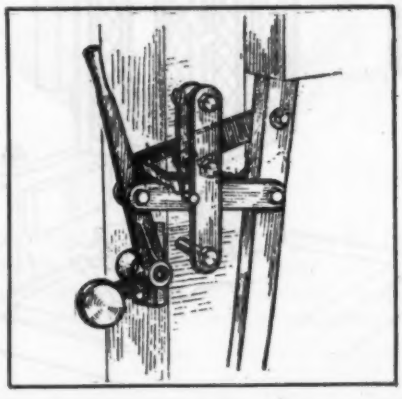
Jigs and fixtures can be provided with special guards without interfering with normal use. This is especially desirable on tools that are not in constant use and would require guard changes if fixed to the press



All props should be designed to support the weight of the hammerhead directly on the die block or bolster. The weight should not be transmitted to bolts or other fastenings in the side frame

Drop hammer props should be counterbalanced to hold the prop out of the drop path when in operation to prevent accidents caused by the prop entering the path while working





Quill Dimensions for Precision Boring

BRUNO HOLMSTROM, TOOL SUPERVISOR, HEALD MACHINE COMPANY

EXPERIENCE has shown that proper chip clearance is achieved for precision boring operations when the quill diameter is selected according to the formula:

$A = 0.70711 \times B$

Where:

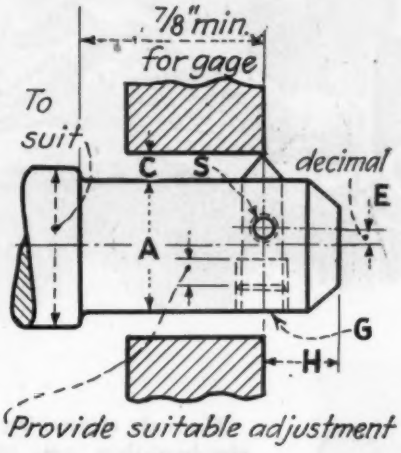
A = quill diameter

B = bore diameter

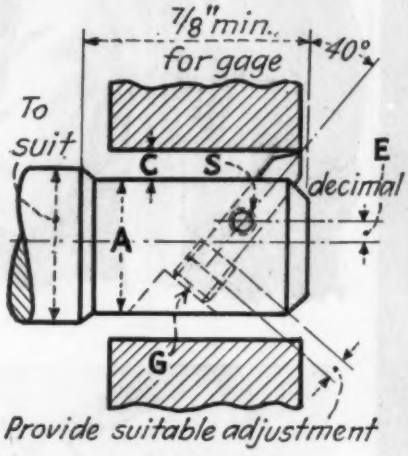
The accompanying table has been worked out on the basis of this formula, and for average finishing conditions only; that is, approximately 0.010 in. stock per side of the bore. When extra stock is removed, chip clearance is a special problem. No quill diameters are given for bores less than 1¼ in. because of special design considerations that arise.

This method allows the use of only one gage for the entire range of bore diameters from 1¼ in. diameter through 6 in. diameter, where single tool quills are used. These gages are made in the form of V-blocks with dial indicators, as shown. Quill diameters are held to ± 0.0001 in. tolerance. This method offers rapid setting to close tolerances.

The note "Decimal" appears on the sketches as a reminder to the draftsman laying out the quill to use a decimal figure at this point, because the screw hole is used as a reference hole when machining the hole for the tool.

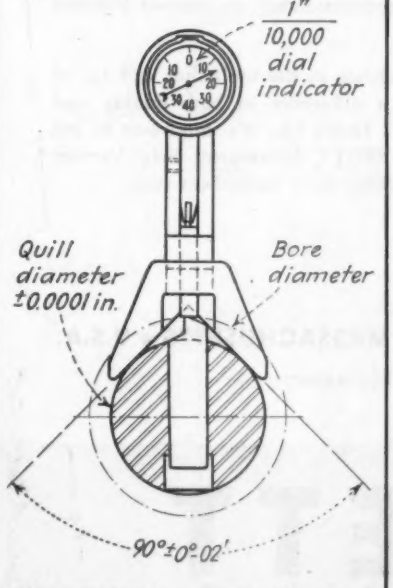


Style 3



Style 4

STANDARD TOOL SETTING GAGE FOR SINGLE-TOOL QUILLS



Use master bar for checking and setting indicator

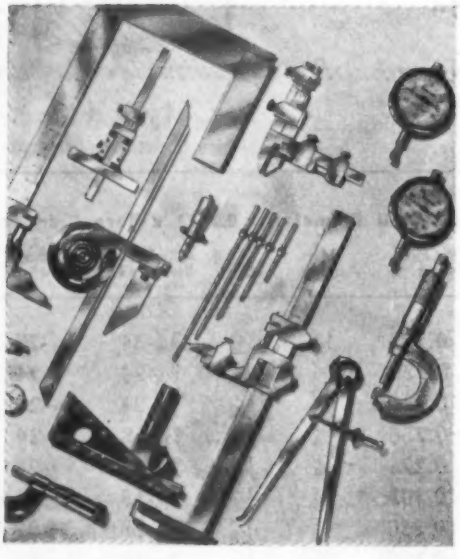
Quill Dimensions Based on Quill Diameter = 0.7071 x Bore Diameter

Bore Dia.	Quill Style	Quill Dia. A	Chip Clear. C	H Approx.	E	Adjustment Screw* G	Clamp Screw* S	Tool Dia.
1¼	3 or 4	0.884	0.183	½	3/32	3/8-34	¼-28	5/16
1½	3 or 4	1.061	0.220	½	⅛	3/8-24	3/8-24	5/16
1⅝	3 or 4	1.149	0.238	¾	5/32	3/8-24	3/8-24	5/16
1¾	3 or 4	1.237	0.256	¾	3/16	9/16-18	3/8-24	½
1⅞	3 or 4	1.326	0.275	¾	¼	9/16-18	3/8-24	½
2	3 or 4	1.414	0.293	¾	¼	9/16-18	3/8-24	½
2¼	3 or 4	1.591	0.330	¾	¼	9/16-18	½-20	½
2½	3 or 4	1.768	0.366	¾	5/16	9/16-18	½-20	½
2¾	3 or 4	1.944	0.403	¾	5/16	9/16-18	½-20	½
3	3 or 4	2.131	0.439	¾	½	9/16-18	½-20	½
3¼	3 or 4	2.298	0.476	¾	½	9/16-18	½-20	½
3½	3 or 4	2.475	0.513	¾	½	9/16-18	½-20	½
3¾	3 or 4	2.652	0.549	¾	¾	9/16-18	½-20	½
4	3 or 4	2.828	0.586	¾	¾	9/16-18	½-20	½
4½	3 or 4	3.182	0.659	¾	1	9/16-18	½-20	¾
5	3 or 4	3.536	0.732	¾	1	9/16-18	½-20	¾
5½	3 or 4	3.889	0.805	¾	1¼	9/16-18	½-20	¾
6	3 or 4	4.243	0.879	¾	1¼	9/16-18	½-20	¾

*Allen flat-point screw.

STARRETT TOOLS

Your Workers Want The Same Name On The Tools You Loan As On The Tools They Own



The *make* of precision measuring tools means a lot to those who have them more or less constantly in hand. If you've been "through the mill" *you* know that—and you know why there's such a marked preference for Starrett Shop Equipment Tools. It's because the men who use them have been literally brought up on Starrett's. They—and their fathers and grandfathers before them—have had Starrett "Mikes", Calipers, Dividers, Squares, Rules in their personal kits; learned to respect their lasting accuracy and appreciate their handling qualities long before they left apprenticeship or manual training school.

Familiarity with and confidence in the tools they call for at the crib makes a whale of a difference in both quality and quantity of precision output. That's why it's important to ask your supply house for STARRETT Micrometer Sets, Vernier Gages, Dial Indicators and other shop equipment tools.

Now, with 3 Service Stars

THE L. S. STARRETT CO. • ATHOL • MASSACHUSETTS • U.S.A.

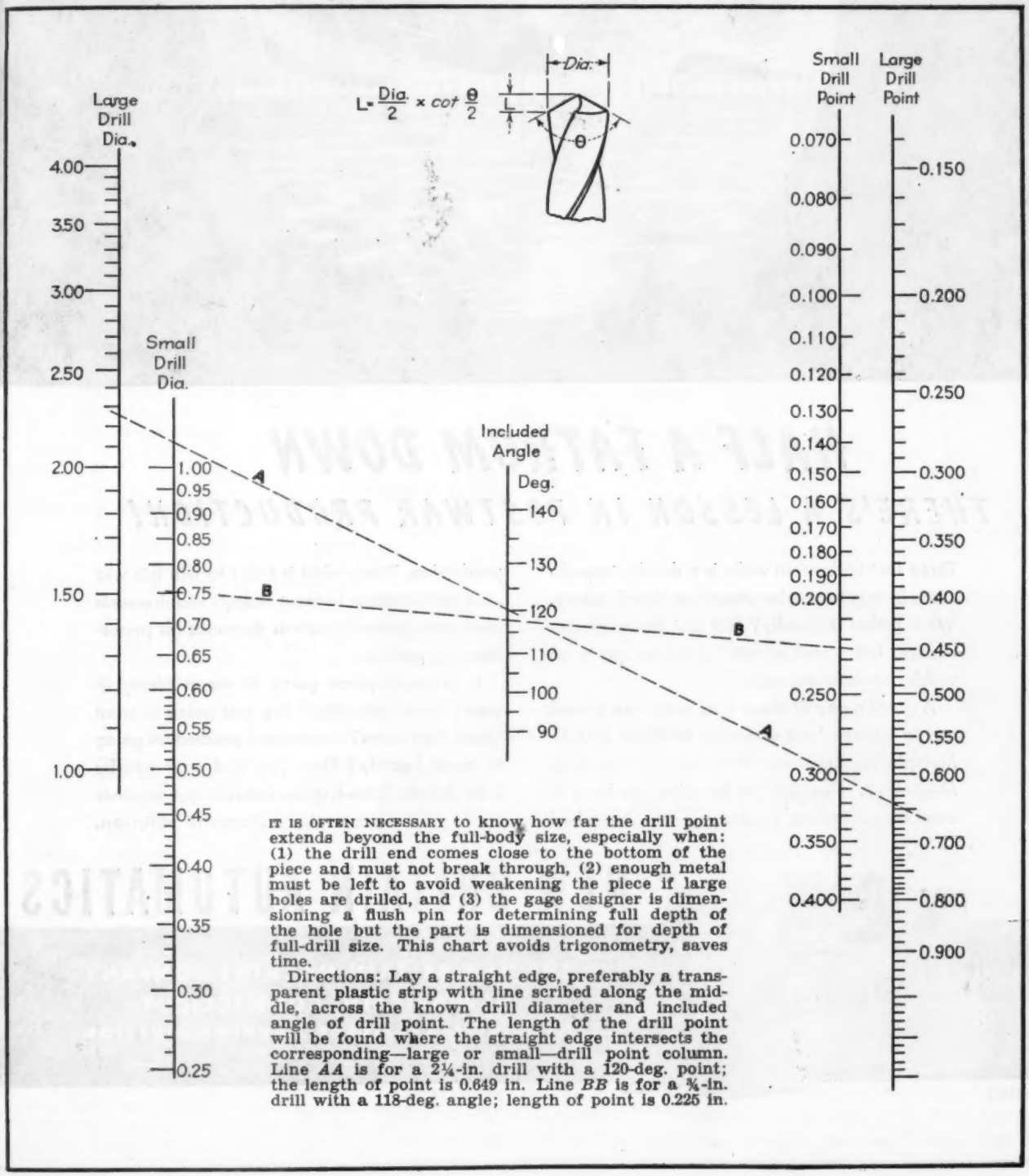
World's Greatest Toolmakers

STARRETT

PRECISION TOOLS • DIAL INDICATORS • GROUND FLAT STOCK
HACKSAWS • METAL CUTTING BANDSAWS • STEEL TAPES

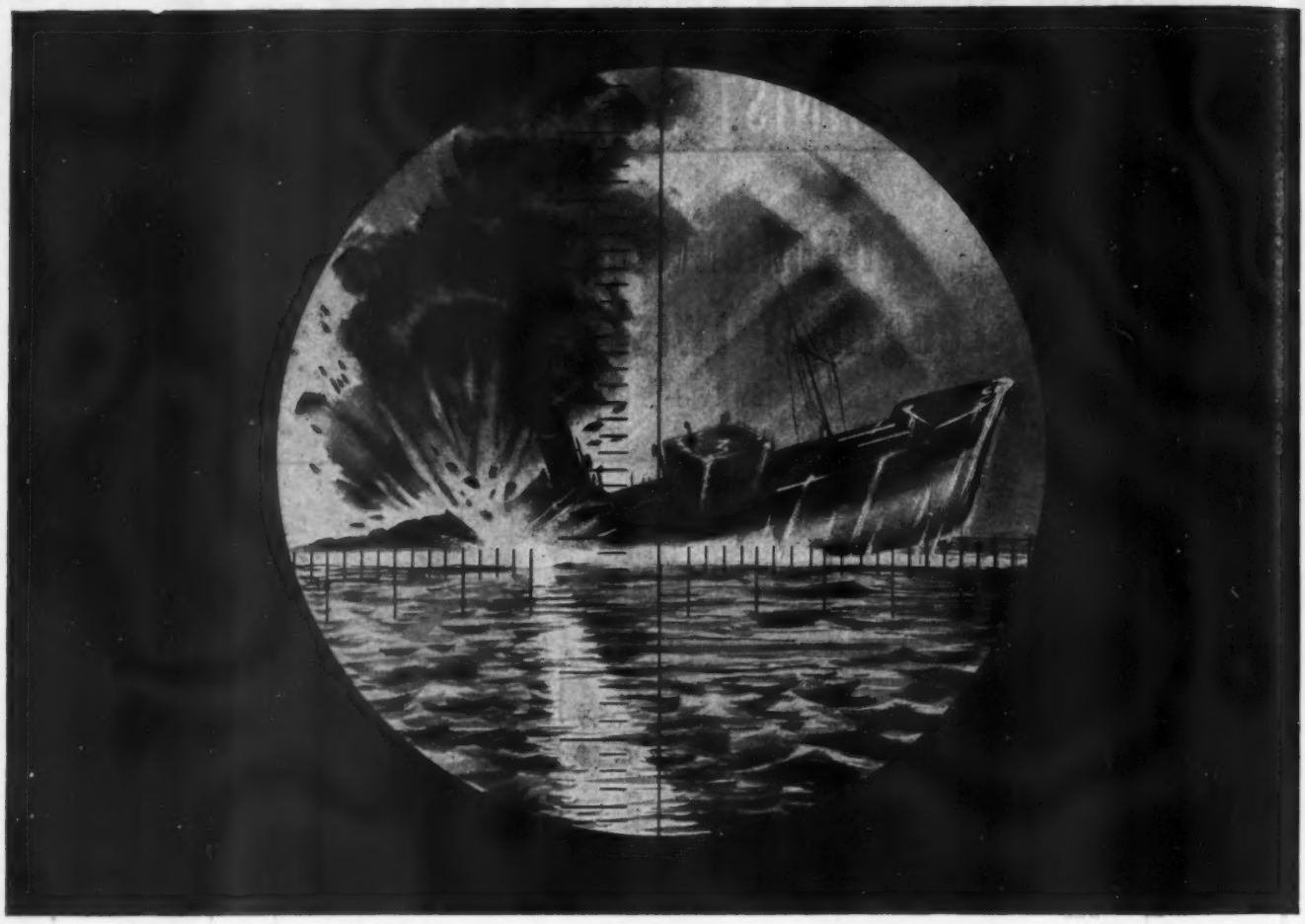
Alignment Chart for Length of Twist Drill Point

BY L. deL. BERG



IT IS OFTEN NECESSARY to know how far the drill point extends beyond the full-body size, especially when: (1) the drill end comes close to the bottom of the piece and must not break through, (2) enough metal must be left to avoid weakening the piece if large holes are drilled, and (3) the gage designer is dimensioning a flush pin for determining full depth of the hole but the part is dimensioned for depth of full-drill size. This chart avoids trigonometry, saves time.

Directions: Lay a straight edge, preferably a transparent plastic strip with line scribed along the middle, across the known drill diameter and included angle of drill point. The length of the drill point will be found where the straight edge intersects the corresponding—large or small—drill point column. Line *AA* is for a 2¼-in. drill with a 120-deg. point; the length of point is 0.649 in. Line *BB* is for a ¾-in. drill with a 118-deg. angle; length of point is 0.225 in.



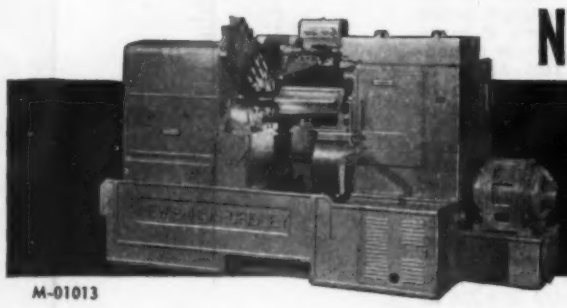
HALF A FATHOM DOWN

THERE'S A LESSON IN POSTWAR PRODUCTION!

Three feet under that wake is a deadly torpedo ...on its way to another American Naval victory. What makes it deadly? Not just the explosive charge, but scores of vital precision parts on which accuracy depends.

A great many of these vital parts are turned out in tremendous quantity on New Britain Multiple Spindle Automatic Screw and Chucking Machines... New Britains because you have to combine unfailing accuracy and unmatched production. That's what it takes to win this war ...a performance to meet today's requirements and managements' postwar demands for peace-time competition.

Is price-per-piece going to mean plenty in your postwar planning? Are you going to want closer tolerances? Is sustained production going to count heavily? Then you and your nearby New Britain Sales-Engineer should get together soon, and discuss the automatic solution.



M-01013

NEW BRITAIN AUTOMATICS

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN, CONNECTICUT
NEW BRITAIN-GRIDLEY MACHINE DIVISION

Gaging Business

Rating Blocks Reconversion

The AA-3 rating which the War Production Board has given to machine tools for reconversion is inadequate, according to industry observers. This rating would permit tool builders to fit the badly needed tools into their order books, provided that they could get the necessary steel, castings, bearings, motors with the AA-3 rating. But the fact is that they cannot, which means that WPB's action in granting this rating for reconversion was nothing more than an empty gesture.

The volume of AA-1 business continues high on tool builders backlog, and perhaps as much as $200,000,000 of the industry's March 31st backlog of $310,000,000 consists of AA-1 orders. This is equivalent to five month's output by the industry at the March rate of $39,374,000. However, the inequalities of pressure upon different types of machines required for war uses and for Russia result in some productive capacity being available for reconversion types of tools. But Russian orders are rated AA-1 and they are blocking nine of the 35 plants able to produce the major types of tools required for reconversion by the auto industry.

Military Pressure Eased

Tool builders are relieved that several hundred millions in additional military orders were not placed, as had earlier been predicted, but they are caught in the middle between the War Production Board and reconverting industries. They still have about eight month's backlog of unfilled orders on hand, of which some $90,000,000 consisted of unrated business, mostly for reconversion. This is the business which will be rated AA-3 under the recently announced WPB policy.

However, the volume of new orders, which was $52,536,000 in March, is still well above the industry's shipment rate. It is expected that net new orders in April dipped sharply, as the military cancelled the heavy tank and the medium ammunition programs. But steady orders continue to be placed for replacement tools needed in the plants of war contractors.

Foreign Business Slants

Rating trouble is costing the American tool industry millions in potential foreign orders, too. Until a short time ago, the French were reported to be shopping for some $100,000,000 in American machine tools to help rehabilitate France. However, they were unable to secure any rating from the War Production Board, nor could any hope be given them by the Foreign Economic Administration. As a result, it is now reported that the French are placing orders in Britain. They are said to have already placed orders for tools required to help rehabilitate the French rail system.

VE-Day Prospects

The gloomy prospect for VE-Day reconversion tools offset the fact that some 2,500,000 to 3,000,000 tons of steel will be available during the first quarter after Germany folds up. Industry's inability to get the necessary tools may leave much of this steel unasked for. On the other hand, it is reported that the railroads will badly need 175,000 tons of steel in the next three to four months, if they are to take care of badly needed repairs and replacements.

It is reported that in the very near future there may be enough material and labor available in some areas to permit long-needed construction of hospitals, emergency housing, pilot plants, and so on.

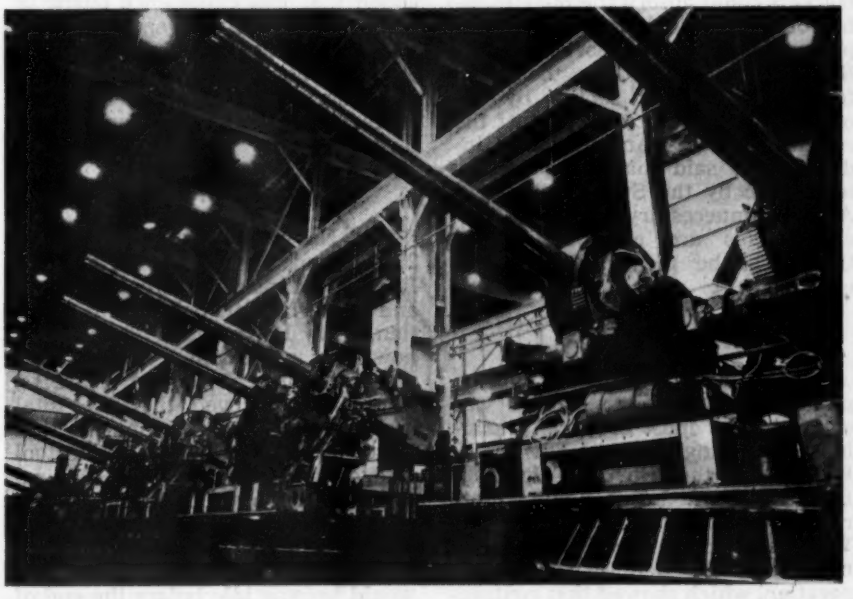
Labor Easing

Reports from the Mid-west and the West Coast indicate that the cuts that have been made thus far in munitions, tanks, and planes are already easing the labor situation. Workers, however, in the case of the aircraft industry are being transferred to planes which will still be urgently needed, such as jets and the B-29's. West Coast shipyards have been hard hit by the cuts in the shipping program, and are now taking on important amounts of repair and refitting work for war ships in that area. In fact, some yards are being expanded for this purpose.

The easier labor situation on the coast has permitted an easing in manpower rulings, enabling some workers to transfer to less essential industries. This may be the forerunner of the conditions that may spread over the country, as VE-Day cuts begin to hit the nation in general. The easier situation in labor will probably permit workers to transfer to non-essential industries, after which a pinch in labor could easily develop when essential industries have reconverted and are ready to take on peak forces. This condition is what was reported to have been behind the recent pressure for manpower legislation.

Tool Freeze Lifted

On April 25th, the RFC's freeze on surplus tools sales, imposed by the military on December 22, was lifted. This action was followed by RFC's offering of 8,617 new tools and 1,155 other items, in their original crates, at Springfield, Illinois; and 1,200 secondhand tools at Indianapolis, Indiana. Sales of the new tools are made at OPA ceiling prices, used tools are sold by bid.



Dual-purpose Naval Guns—These 5-inch guns at the Louisville Naval Ordnance Plant, operated by Westinghouse Electric and Manufacturing Company, are destined for destroyers, cruisers, and battleships. The guns have made outstanding records against both enemy ships and planes

Industry, Government Officials Discuss Surplus Tools

Senate Small Business Committee hearings unveil surplus disposal headaches. Kirk of Pratt & Whitney says 683,000 old tools are real "surplus problem." Government agencies claim to hold 724,000 tools. Figure doubted

WASHINGTON—The Senate's Committee on Small Business was assured by government and industry representatives that after the war there would be enough surplus tools available for anybody interested in acquiring them. Moreover, William P. Kirk, vice president and sales manager, machinery department, of the Pratt & Whitney Division, Niles-Bement-Pond Company, pointed out that the "real surplus" consisted of the 683,000 old machines still operated in American industry, and not in the 700,000 or so government-owned machines in good condition and suitable as replacements for the old equipment.

Mr. Kirk, at the April 27th hearings held by the Surplus War Property Subcommittee of the Senate Small Business Committee, pointed out that every possible channel of disposal should be opened as quickly as possible, including: (1) sale to contractors now operating the tools, wherever possible; (2) sale to government entities, schools and colleges; (3) sale by DPC direct to the user on an "as is, where is" basis, as is now being done; (4) sale through used machinery dealers; (5) sale through the original manufacturer after rebuilding the tools, with guarantee and servicing offered by him. Mr. Kirk doubted that export markets could absorb the huge number of surplus tools involved, citing pre-war figures to support his point. But he urged that those tools sold for export be first rebuilt by the original manufacturer to protect the reputation of the American tool industry. He said that the priorities laid down by the Surplus Property Act are unnecessary, so far as machine tools are concerned, since there will be plenty of tools for everybody.

Plenty of Tools

The premise that there will be plenty of tools to go around was supported by most of those attending the hearing. Colonel Edward H. Heller, of the Surplus Property Board, reiterated this point, referring to a survey conducted by the War Department, the Navy Department, and the Defense Plant Corporation, which showed that contractors in possession of government-owned tools would be interested in buying only 25 percent of them. He pointed out that the estimated surplus after VE-Day would be about 441,000 machine tools, which would be placed on sale, out of the 723,000 tools held by the various war agencies, as follows: DPC, 285,000; Army, 162,000; Navy, 254,000; Maritime Commission, 22,000.

Col. Heller emphasized that reconversion and postwar considerations necessitated that contractors in possession be told soon whether or not they will be permitted to buy the tools they have. He stated that such sales would naturally be limited to exclude tools deemed in short supply, that sales of more than $1,000,000 in tools would be reported to the Attorney General, and that subcontractors desiring to buy will be protected.

World War I Confusion

Postwar confusion after the last war was outlined by Wendell Berge, Assistant Attorney General of the United States, who pointed out that the government did not then know how many machines it actually owned. It first was estimated by the War Department that $300,000,000 in machine tools were owned, but this amount was gradually reduced to $50,000,000. However, the threatened size of the surplus disrupted disposal plans, and many tools were carelessly stored and scrapped. He added that this experience ought to guide the Surplus Property Board and owning agencies in developing a tool disposal program which will not disrupt the industry, and will protect new enterprises and small business.

Navy Postwar Plans

The Navy was declared to own 254,706 tools by Rear Admiral W. A. Buck, assistant chief of procurement and material for property disposition, Navy Department. This figure, however, was doubted by industry members present at the hearings, since it is believed that the total includes production equipment that is not actually in the "machine tool category." In any event, Admiral Buck pointed out that because of the Navy's requirements for the Japanese War, it would be unable to estimate the number of its tools that would become idle before the end of the war in the Pacific. But he said that after Japan is defeated, the Navy might retain 118,356 of the "tools" it owns. He said that contractors in possession were interested in purchasing 34 percent of the 155,350 Navy-owned tools in their plants. Such sale, and Navy retention of its requirements would still make available for general sale 75,000 Navy tools.

Used Tool Problem

Burnham Finney, President, American Machinist, stressed the fact that the government-owned surplus tool problem might be complicated if a large number of used privately-owned machines were placed on the market after the war. Such machines could be offered at lower prices than those set for government-owned tools, thereby disrupting the market for surplus machine tools. He stated that some program should be devised to encourage manufacturers to scrap the very old machines in their shops. He compared British disposal plans with those now being developed here.

This thought was enlarged on by H. H. Pease, President, New Britain Machine Company, who recommended that the government offer a discount from the Clayton Price formula to those manufacturers ready to scrap an old machine to be replaced by a government-owned machine. He warned that the first consideration in dealing with government-owned tools is to be sure that our arsenals and navy yards are thoroughly equipped with modern machine tools from this surplus.

The National Screw Machine Products Association submitted a printed booklet presenting the critical position of its industry unless older screw machines are junked, and recommended that a 25 percent discount below prices set for government-owned surplus tools be granted to firms agreeing to scrap old machines.

TOOL EXPORT GROUP FORMED

NEW YORK—To offer sales, engineering and service to Latin-America, four leading tool builders have formed AMTEA Corp. (American Machine Tool Export Associates) with offices in the Empire State Building here. Initial stockholders include Landis Tool Co., Lodge & Shipley Machine Tool Co., Kearney & Trecker Corp., and Warner & Swasey Co. More member builders will be added, so that AMTEA will be able to buy all types of tools from members with its own capital for export sale.

Senate Hearings Disclose U. S. Owns 724,285 Tools; To Keep 20%

WASHINGTON—Government agencies own 724,285 machine tools, according to disclosures made April 25th at Senate Small Business Committee Hearings on surplus machine tool disposal. It was revealed further that the Navy Department will keep 126,456 tools after the war for its postwar reserve, while the Army will retain 29,789 tools. This means that the balance of government-owned machines tools, or 468,140 will largely be available for disposal to private industry.

Largest holder of machine tools, is the Defense Plant Corporation, RFC subsidiary, which was declared to have about 285,000. The Navy was not far behind with its 254,706 tools, the Army was third with 162,579 tools, while Maritime Commission held the smallest total of 22,000. This amount is substantially larger than the 600,000 tools which had been previously rumored to be held by the government.

RFC Disposal Plans

Mr. Walter Joyce, Assistant Director, Surplus Property, for RFC, outlined that agency's disposal program: (1) Adequate descriptive inventories to be maintained in each RFC Disposing Agency; (2) Cooperation with other public agencies, with States and local governments, and with various institutions in carrying out priority schedules; (3) National listings and regional detailed catalogues to be issued and widely circulated at frequent intervals, supplemented by an aggressive national sales campaign; (4) Proper preparation of machine tools against rust and deterioration; (5) Proper and adequate storage facilities (disposal centers) with display rooms, affording prospective purchasers the opportunity of inspecting equipment prior to purchase; (6) Price tag basis, determined by an established formula or appraisals, for older tools other methods, such as bids, auctions, etc., will be used; (7) Sale of machine tools on an individual basis rather than in lots; (8) Sales of tools on a deferred payment plan where necessary with minimum down payment of 15 percent and maximum credit of five years at 4 percent interest; (9) Leasing of machine tools where advisable; (10) Prompt shipment of tools and prompt settlement of claims; (11) Development of sales outlets.

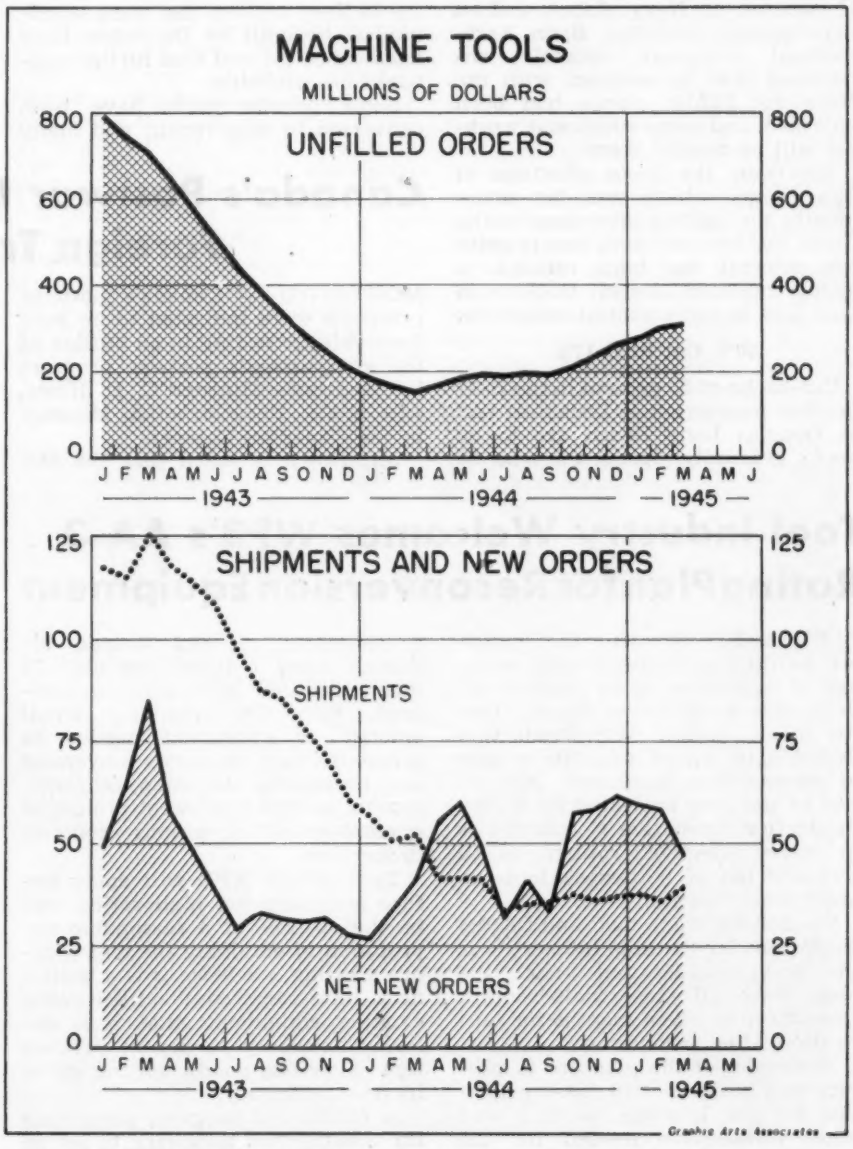
Navy Holdings Described

In a presentation by Rear Admiral W. A. Buck, Assistant Chief of Procurement and Material for Property Disposition, Navy Department, it was disclosed that 238,842, or 95 percent of the Navy's tools, were standard general purpose items, and the Navy planned to retain 113,346 of these, while it expected to keep 5,010 of its 15,864 special purpose tools. The Navy's holdings consist of 191,899 tools five years old or less and 62,807 tools over five years old. It is likely this total includes non-tool items.

Brig. Gen. David N. Hausman, Director, Readjustment Division, Army Service Forces, pointed out that only 15,897 of the Army's tools are over five years old, with the balance of 146,682 being less than three-and-one-half years old on the average. The Army's tools consist of 133,224 standard purpose tools, of which 145,902 are installed in industrial facilities, and 29,355 special tools all of which are installed in industrial facilities except for 100 in command installations. The Army will retain 34,425 of its standard tools and 4,636 of its special purpose tools.

Army Release Plan

Brig. Gen. Hausman stated that the War Department estimates that within 60 days after VE-Day, the Army can release 12,020 standard tools and 3,000 general purpose tools. Thereafter, it is estimated that monthly releases will approximate 4,400 standard tools and 600 special tools. The General stated that the War Department believes that at the end of the war, tools will be released faster than they can be sold.



Pressure Eased—The steady rise of the tool industry's backlog in recent months levelled off in March, and probably turned down in April. March shipments at $39,374,000, were up 9.3 percent over February's $36,018,000. Net new orders dropped 19.5 percent to $52,536,000 from $61,823,000. As a result, unfilled orders at the end of March stood at $309,650,000

Plane, Ship Cuts Ease Coast Labor Shortage; Reconversion Signs

LOS ANGELES—Cut-backs in every type of war production are being made almost daily on the Coast, rapidly wiping out labor shortages in all areas. It is estimated that 100,000 aircraft and shipyard workers will be laid off within the next 90 days, according to Glenn Brockway, deputy regional director of the War Manpower Commission. But he believes that re-employment plants will keep pace with the lay-offs, so that net lay-off may not exceed 25,000.

In San Diego, production of B-24 *Liberator* bombers will be terminated at Consolidated Vultee Aircraft Corp. on May 25, although work will be continued on the B-32 *Dominator*, on Navy planes, and on experimental projects. Ryan Aeronautical Company recently announced that its contract with the Navy for fighter planes had been enlarged, and some additional workers will be needed there.

However, the labor shortage in San Diego, which was for many months the tightest labor area on the Coast, has been so eased that priority job referral has been relaxed to enable replaced aircraft workers to take jobs in non-essential industries.

50% Cut in B-17's

Cut-backs of 50 percent in the B-17 bomber production at Lockheed and at Douglas Long Beach are to be made, gradually, during the next 60 days. At both plants it is anticipated that most workers will be absorbed by the newer projects, the A-26 bomber and cargo planes at Douglas, and the P-80 *Shooting Star* (jet) at Lockheed, and by other projects which are expected to be continued. Production of the P-38 *Lightning* by Lockheed will also be tapered off gradually in favor of the new fighter.

Shipyards Slow Down

Ship construction fall-off rate is being accelerated at all Coast yards. Kaiser's Swan Island yard at Portland will go to one-shift operation, reducing the labor force to 10,500, with the announcement that six of the 30 Navy tankers that were scheduled to be built by December have been cancelled and that further cutbacks are probable.

Some private yards have been converted to ship repair, and many workers released by the continued fall-off in new ship construction are finding work there, and in the Navy yards at Terminal Island and Hunter's Point. Overhaul and repair of battle damage is keeping these Navy installations busy.

Reconversion Sign

Although reconversion has not been appreciably speeded up, as yet, it will undoubtedly be necessary that it be done, and promptly, in order to cushion the effect of these cut-backs. One major step has been taken with the announcement that General Motors will proceed immediately with the renovation of its Los Angeles plant (Southgate), preparatory to resumption of production of automobiles. More than $1,200,000 will be required to renovate, re-arrange and expand the plant, which was used for the production of tanks earlier in the war, and for aircraft subassemblies up until a few months ago. Other major reconversions can be expected in the more or less near future.

Canada's Postwar Employment, Foreign Trade to Top Prewar

MONTREAL — Canada's postwar prospects were indicated to be very favorable, according to an outline of the government's postwar program by Munitions Minister C. D. Howe, who is also Reconstruction Minister in the Canadian Cabinet.

Mr. Howe revealed that the Dominion's war production will continue at present peak levels until the end of the war in Europe. After the war, 900,000 more workers will be employed in Canada than were employed in 1939. A 60 percent increase in export trade over prewar is looked for, and a 15 percent increase in imports. Material for the construction of 50,000 housing units will be released in the year following the end of the European War.

Manpower Easier

The number of persons in the armed forces or otherwise employed in Canada on June 1, 1944, totaled 5,016,000, compared with 3,693,000 in 1939. Referring to this all-time high in the Canadian labor force, Humphrey Mitchell, Labor Minister, said that the labor supply was easier than it had been for some time, but still remained tight. He said that wartime employment controls may have to be continued until the end of the war with Japan in order to meet the problem of re-establishing war veterans.

Wage rates are at their highest in the Dominion's history, and take-home pay has been further increased by overtime. Mr. Mitchell stated, "It can be said, too, that working conditions are better for many of our workers. Since the outbreak of war, vacations with pay have been introduced covering about 905,000 employees, and welfare plans, such as group insurance, pensions, and employee hospitalization schemes have been extended to over 541,000 employees."

Tool Industry Welcomes WPB's AA-3 Rating Plan for Reconversion Equipment

CLEVELAND—Machine tool builders, battling an industry-wide average of eight months in unfilled orders, were nevertheless hopeful that the newly devised War Production Board plan would expedite output of reconversion equipment. Net effect of the plan projected by WPB's Production Executive Committee is to give selective ratings to a screened list of bottleneck tools on order since last fall.

The $50,000,000 in tools and related equipment for the auto industry was the first consideration under the plan, since all these tools require from three to seven months for fabrication after scheduling.

Mechanics of the plan are to provide tool builders with AA-3 priorities for the bearings, motors, and other components needed for the screened list of equipment for the automotive plants. Diversion of some orders and re-examination of schedules will assist this system.

Changes in munitions requirements are currently producing many cancellations of tool orders, although some builders are still 12 months behind. WPB believes, however, that the relatively small amount of equipment needed to grease the auto industry's conversion can, by skillful allocation, be forthcoming in time to prevent prolonged unemployment or serious economic dislocation.

Tests which WPB will apply before assigning the high rating will be the absence of a reasonable expectation of obtaining the tool without a rating; evidence it is a bottleneck item required to utilize other existing equipment; that it is actually necessary to permit production of civilian goods, not merely to increase efficiency.

A $35,000,000 program permitting the construction necessary to set up workable production lines was approved by WPB under the same conditions. This policy, again, is strictly confined to actual civilian production needs, will not permit any large-scale expansions at this time.

Detroit Letter

Plane Work Tapers

As far as war production here is concerned, plants are operating on a post-V-E Day schedule. Ford Willow Run is winding up its *Liberator* output. Briggs and Murray are tapering off on the B-17 parts which was sub-contracted to these two plants. Hudson has shaved its P-38 contract.

These are the three largest subcontractors on these particular jobs. Hundreds of "little fellows" are likewise affected and with them thousands of production workers.

The 15 per cent drop in the overall aircraft program is expected to affect at least 200,000 workers in this area. This does not mean 200,000 will be out of work in the immediate future. But it means this number will shift jobs, that the peak of war production is past and from now on the building up will be on the civilian side.

The auto plants are feverishly preparing for this day. With the War Production Board finally behind all the plans they made a year and a half ago, the car manufacturers are making their factories ready for a fast changeover when "Go Day" comes. Suppliers and parts makers, likewise but in a lesser degree, are getting in shape for orders.

Adjusting Plant Work

The jockeying now consists of trying to concentrate their continuing war work in plants which they do not need immediately, to free space in which to make the coming cars. The real bottleneck promises not to be machine tools, materials or facilities but body making plants.

C. E. Wilson recently voiced this fear at a press conference. He revealed that General Motors planned to meet it partially by holding its divisions to one or two models at the beginning.

The $125,000,000 program which WPB approved for the industry to get it into shape for new car production promises to be just a drop in the bucket. Some of the larger companies spend that much or more on tooling up for a new model. But this represents only the absolute minimum which the industry itself set as its needs. Strangely enough, it was learned from reliable sources that the biggest needs were set by the smaller companies rather than the larger ones.

Retooling Needs Changed

The $125,000,000 is merely a recapitulation of the needs placed before WPB a year and a half ago in the forward planning of the industry to head off unemployment when war production fell off. The needs were brought up to date last Fall at the industry meeting and again brought up to date just recently.

Although all companies will get equal treatment in being allowed to start new car output, not all will be in the same position to start. Some are better equipped, some are better prepared and some will bear a heavier load than others of the continuing war program.

Ford Cars First?

The Ford Co. promises to be the first to bring new cars out. Jack Davis, sales manager of the company who is doing an astonishing job of rebuilding a badly dissipated sales force, stated that Ford's would be able to bring out its first cars in 60 to 90 days after the go signal.

Wilson said that all GM divisions were on a par as far as being ready to make cars. No division would be given preference over another, he stated firmly, even if it meant confining each to a single model. Materials would be apportioned equitably so that all could get off to the same start, he said. Previous estimates were that GM could produce cars in from three to six months.

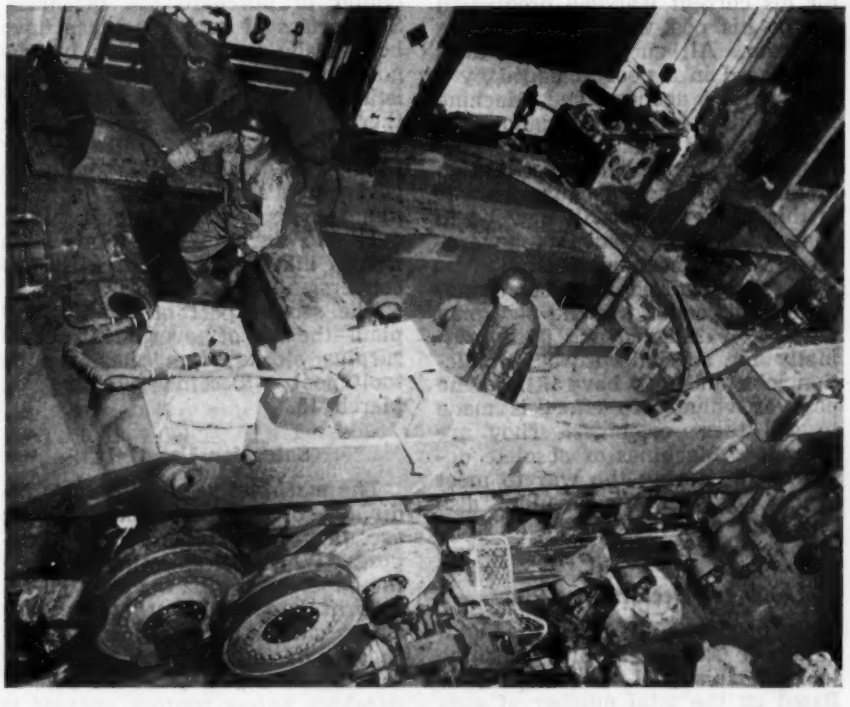
Chrysler stands in about the same position as General Motors and will be ready in about the same period. Its spokesman would make no commitments as Wilson's on how the divisions would be handled, as to an even start.

Packard Takes Longer

Packard, with its Rolls engine contract being shaved, is expected to be ready in three to six months. Additional space has permitted the company to push some of its war work from its main plant and the resurrection of its parts line, even on a skeleton basis, puts the company in good position to start building cars quickly. George T. Christopher, president of Packard, has set a production goal of 200,000 cars a year.

The other independents are also aiming at a three to six month figure. Only Graham-Paige will not be in the starting lineup. It has an entirely new car projected on paper and because it was not in production the last two years before Pearl Harbor, it probably will not have a car on the market for a year after the others start up.

Once the face-lifted 1942 models begin to roll off assembly lines, don't be surprised to see some entirely new ones rolling around the proving grounds. The engineering help of last Fall will begin to show up in some different postwar cars.



German Heavy Tanks Cancelled, Too—This new type German tank was captured by American troops before it could be completed. Discovered in a factory scarcely big enough to house it, the tank is equipped with larger gun turrets, 5-inch armor, 39-inch tracks. Size of guns was not learned

British Disposal Method for Surplus Government Tools

Purchaser, tool industry and used machinery dealer protected by "Interim Disposal Plan," supervised by The Machine Tool Control. Plants operating government tools have first buying option, otherwise first-come, first-served applies

BY WILLIAM J. HARGEST,
AMERICAN MACHINIST'S WAR CORRESPONDENT

LONDON—The British Government has evolved a disposal plan for its surplus machine tools which effectively overcomes speculation, and protects the interests of the purchaser, the tool builder and the used machinery dealer. Called the "Interim Disposal Plan," it has functioned so well that government officials only anticipate minor changes in drawing up final disposal plans after the war.

Tool Control Responsible

Machine tools today considered as surplus may be (A) Second-hand and not installed in factories, (B) used machines in closed government-owned plants, (C) used machines idle in government plants because of cut-backs in production or because the work for which they were installed has been discontinued, and (D) used government-owned machines turned back by private industry because they are not required by the lessee either for his current wartime production or for his post-war manufacturing program. All such machine tools are placed in a pool managed by a government agency—The Machine Tool Control—which throughout the war has had charge of the purchase, allocation and redistribution of all metal-working equipment. It is this agency that will now be in charge of selling surplus government-owned machine tools.

It is recognized that some machine tools coming to the pool may have been designed and built originally for specialized war production jobs, and may have little or no postwar value. No effort is made to sell these machines. They are scrapped. Machines of obsolete design, built during the war to meet urgent production demands, also find their way into the pool. They, too, are scrapped.

Surplus Declarations Slow

As of April 7, 1945, the total value of salable surplus machine tools in this pool was $12,000,000. Based on the total number of government-owned machine tools still allocated to war production, current surplus stocks are far from excessive. And it is unlikely that the surplus will exceed the present number until Germany is decisively defeated. The movement of government-owned machine tools to surplus stock is today a lengthy procedure. The Ministry of Supply, Ministry of Aircraft Production, the Admiralty, the Ministry of Education, Ministry of Labor, and others, must each declare a machine tool surplus before it can be released.

The disposal plan is divided into two parts: (1) The sale of government-owned tools to the present user should he need them for his postwar production program; (2) The sale of surplus units from the machine tool pool.

Operators Have Option

The first part of this plan is mandatory, because the government, on allocating machine tools to industry during the war under a so-called "Assisted Scheme," negotiated contracts with private firms many of which carried a pre-emption clause whereby the firms are given first option to purchase the machines. Sale prices of such machines have been made very attractive by the government, often less than the existing "used value" of the units, thereby encouraging the current user to adapt them for his postwar production. This is in line with the government's stated policy of making surplus machine tools easily available during the period when British industry is planning the reconversion of its factories.

The second part of the disposal plan—the sale of government-owned surplus stocks from the machine tool pool — became effective on March 15.

Sales for Use Only

The machines are sold only to individals or companies intending to use them for manufacturing purposes. When making the purchase the buyer must give the government a written guarantee that the machines will be used only in the purchaser's business and will not be resold within a year from the date of purchase unless written consent is obtained from the Machine Tool Control. This is intended to control speculation in machine tools and prevent a recurrence of the 1918-19 debacle when surplus machines were sold haphazardly from government stores to flood the market and disrupt the machine tool industry for years afterwards.

Firm Prices Fixed

The price of each and every machine tool is fixed by the Machine Tool Control, and is based on its condition, but with consideration given to years of service, as well as to basic and complementary tooling. Once the price is set, it is inflexible. Prices are made attractive by the government in order to facilitate the sale of the machines and speed the re-equipment of British industry for postwar production programs.

Available Machines Listed

For the convenience of intending purchasers throughout Britain, complete stock records of government-owned surplus machine tools are maintained by the Machine Tool Control at its regional offices in London, Birmingham, Bristol, Glasgow, Leeds, and Manchester. These cities are now called the disposal centers. As the Machine Tool Control is notified that a machine tool has become available for inclusion in the surplus stocks, it is added to the master record in the London office, and the information is immediately teletyped to each disposal center.

The records are kept in loose-leaf form, each leaf containing pertinent data on only one machine. Such data include the type of machine, its size, brief specifications, available tooling, its pool code number, its price, and its location.

The stock records at each of the disposal centers are available for inspection by prospective purchasers between 10 a.m. and 4 p.m. daily from Monday through Friday. Inquiries by telephone or mail as to the availability of particular machines are prohibited. Machine tools listed in the stock records may be either in government disposal warehouses or still in the plants where they were installed originally. Following the war, however, all tools in the surplus pool will be moved to disposal centers.

Dealers' Actions Limited

No used machinery dealer can purchase these surplus machine tools for the purpose of overhauling and reselling them. Nor can dealers purchase them for direct re-sale. However, the British government recognizes the fact that prospective purchasers will decide in specific instances that a used machinery dealer can render a service in selecting on behalf of users suitable machines. This is particularly true

should a purchaser make his selection at a disposal center far distant from the actual location of the machines in which he is interested.

In every instance, however, the sale is directly between the government and the user, and the sale price of the machine is the same whether or not the purchaser decides to use the services of a dealer. The government has entered into agreements with a number of dealers under which the government will pay them a commission—reported to be 5 percent—for their services in selecting machines on behalf of users. The commission is paid only if a sale results and the user certifies that the dealer has rendered the stipulated service. When surplus stocks reach a peak following the Japanese war, it is expected that used machinery dealers will find this a highly remunerative business. In addition, the dealer can negotiate a contract with the buyer for crating and shipping the machine tools; also, for overhauling them should that be deemed necessary.

A list of "Approved Dealers" holding such agreements with the government is available at each disposal center of the Machine Tool Control. Practically all dealers of repute, who were licensed at the beginning of the war to conduct a used machinery business, are included in the list. Licensing of dealers prevented mushroom growth of the used machinery business during the war, and protected firms established in that field.

Purchase Procedure

A prospective purchaser visits the nearest disposal center of the Machine Tool Control and is instructed in the use of the stock records. He is given a "Selection Form," whereon can be recorded the pool number, description, price and location of each machine tool in which he is interested. Space is provided for the buyer to name an approved used machinery dealer to handle actual inspection and purchase should he wish such service.

When he completes his selection, an official at the disposal center signs a permit authorizing the prospective purchaser or his accredited agent to visit the warehouse or plant where the machine is located.

After inspecting the machines, the buyer or his agent fills in an "Offer to Purchase Form." This includes the same data as the "Selection Form" does. This form is filed only at the main office of the Machine Tool Control in London, and is time clocked. Should more than one buyer select the same machine tool, the earliest offer is given precedence.

After receiving an offer to purchase, the Machine Tool Control forwards an "Acceptance of Offer" to the buyer. This serves as an option for the buyer, and he is given 14 days in which to consummate the purchase. Should he not do so within the given period, the machine or machines revert to the pool if there are no other offers to purchase. "Acceptance of Offer" forms are forwarded to the buyer in duplicate, one copy of which has to be returned to the main office of the Machine Tool Control in London, together with the purchaser's check and the declaration as to use of the machines duly signed.

When purchase arrangements have been completed, and payment in full made, the Machine Tool Control authorizes the buyer to collect the machine tools. The buyer must make his own haulage arrangements, and remove the tools within 28 days.

British Retaliation Against V-Bombs—This scene in a British plant shows the first stage of the production of the new 22,000-lb. bomb in a Ministry of Aircraft Production Factory in England. This is the type used to bomb Hitler's hideout. The bomb is cast around the framework on which rope made from wood shavings is wound

Disposal of New Tools

New machine tools purchased by the government, and not installed in factories because of cut-backs in production or any other reason, also revert to the pool. The procedure for selling these machines has not yet been devised by the government. Preliminary plans are believed to include sale of the machines in blocks to the original manufacturer. It is reported that the machine tool builder will be allowed a small discount from the original sale price, and that this discount will barely be sufficient to restore each machine to "new" condition. This may be true even though the machines are in poor condition from long storage or mishandling, and the manufacturer may deem it necessary to dismantle and rebuild them completely. Those new machines which the manufacturer may not wish to repurchase will be pooled and offered for sale through the disposal centers on the same basis as second-hand machines.

Conditions of Sale

Following is a brief summary of other rules under which surplus machine tools are purchasable from the pool:

1. CONDITIONS OF MACHINE TOOLS. Machine tools must be bought as they lie. The contractor must satisfy himself thoroughly as to what is offered for sale before submitting his offer to purchase, and in order to do this he is given every opportunity to inspect the machine tools. Once the offer to purchase is made, and is accepted, the machines must be taken with all faults, even if errors or mis-statements have been made in description, measurements and weights.

2. AVAILABILITY AND PRICE. The prospective purchaser must take the risk of machines ceasing to be available, or the price being altered any time before acceptance of the offer to buy.

3. RESTRICTION ON LEND-LEASE MACHINE TOOLS. Those machine tools obtained under the Lend-Lease arrangement, and which are described as such on the "Acceptance of Offer" form furnished by the government to a buyer, cannot be exported within a period of five years from the termination of hostilities with Germany. This restriction is applicable to any subsequent resale of such machines, and must be imposed by the seller in any contract affected within the five year period.

Truman's Influence on Labor Scene Indicates Many Policy Changes

NEW YORK—One of the big questions being asked today by both labor and management is what effect the death of President Roosevelt and the ascendancy of Harry S. Truman to the White House will have on labor relations during the trying period when war demands for ships, planes, tanks and heavy equipment ebb and cutbacks come thick and fast. Specially, the question is just where does government stand today on labor issues.

A few weeks ago the answer was pretty clear on that point. Now with evaluation of President Truman's labor program—such of it as has been made known or pictured in various crystal balls—still going on, the general impression is that for the present the old answers will stand. Labor policies of the Roosevelt administration will not be altered immediately.

Changes of a gradual nature, however, may be expected.

Stronger Labor Department

First of these, will in all likelihood, be appointment of a new Secretary of Labor, to succeed Frances Perkins, who for a long time has been anxious to change from her cabinet post to directorship of the International Labor office. Only friendship and loyalty to Roosevelt kept her in a thankless post for the last four years. Now she may be expected to send in her resignation again; this time it will stick.

Labor has long wanted one of its own people in the cabinet. If the American Federation of Labor and Congress of Industrial Organizations can agree, the new secretary may be from labor's ranks — possibly Edward F. McGrady, Assistant Secretary of Labor from 1933 to 1937, now in charge of labor relations for the Radio Corp. of America and a special labor consultant to the Secretary of War. McGrady is a veteran leader in the A.F.L., might not be acceptable to a C.I.O already fearful of loss of prestige and less support under President Truman. Another possibility is William M. Leirdon, former chairman of the National Railroad Mediation Board and member of the National Relations Board, for several years out of the government.

Unified Agencies

Regardless of who is chosen, one thing is certain: consolidation into the Dept. of Labor of the various labor agencies now outside the department can be expected. President Truman is on record for unification of the National War Labor Board, National Labor Relations Board, Wage and Hour Division of the Dept. of Labor, and the various other agencies which sprung up during the Roosevelt administration. Strong leadership will be necessary for the department in which these agencies are incorporated. The new secretary must be secretary of labor in fact as well as name.

Thus will come another change in labor policies. In the past, organized labor has pretty consistently bypassed the present secretary, gone directly to the President with advice, requests, protests and grievances. Future outlook is for these matters to be handled through proper channels. Access to the White House will still be important, but not as important as during the past twelve years.

Politically, the new president is not regarded—with his predecessor—as left of center. His views generally are nearer dead center, some say a little to the right of center. Thus, while he favors a higher standard of living for workers through wage increases, he wants to achieve that objective through methods acceptable to business, by increasing productivity and plant efficiency. That can't be legislated. The indication is that an era of legislated social and economic reforms may be expected to end. More reliance will have to be placed in collective bargaining and direct labor-management relations, less reliance can be placed in government.

Labor Trouble Likely

This will lead to greater militancy by unions, increased distrust for the Democratic Party and the administration on the part of labor. Labor will make wider use of its strike weapon, with "unauthorized" walkouts which will preserve until after VJ-Day the form—it not the spirit—of labor's no-strike pledge.

NWLB will continue in operation until after the final peace, but will take a firmer stand toward labor. There will be a definite trend toward fewer directives and more arbitration and mediation—the NWLB's pattern for the postwar period when its present powers end.

NLRB will assume greater importance, as labor's civil war is intensified. Harry Millis, high on A.F.L.'s black book, will retire as NLRB chairman at the end of his term in office in August. A.F.L's advice will be sought on a successor.

Speedier decisions by the two labor agencies will be sought, as a curb against less constrained labor tempers and to foster closer labor-management-government collaboration.

UNION EXPELS SIX STRIKE RINGLEADERS, SUSPENDS 8

NEW YORK—In a rarely seen action, six ringleaders of a slowdown strike at the munitions-making Matam Corp. were expelled from the CIO electrical workers union representing 3,000 employees. Eight others partaking in the slowdown designed to force an increase in the incentive wage rate were suspended and fined a total of $325. Since the CIO Local 1227 has a closed shop contract with the company, the 14 workers automatically lose their jobs, although the eight workers suspended can be rehired if they clear up their suspension.

The slowdown occurred in the case-grinding department of the plant and forced scores of workers along the entire production line to remain idle.

Wage Concessions Loom

On specific issues, the administration is expected to show a willingness to let the Little Steel formula be bent, but not broken, and to follow through on the War Manpower Commission's plan for regional relaxation of manpower controls as cutbacks end labor shortages.

In industries in which wages have lagged far behind the rising cost of living, post VE-Day raises may be viewed as certain. NWLB already is considering the situation in several industries, has shown in the textile case that it stands ready to act. Pressure to lift the sub-standard wage rate from 55c will increase as overtime dwindles. The raise in minimums may be expected, and as usual it will result in raises on up the pay scale to preserve differentials. In other industries a raise (possibly 8%) may be allowed to compensate for the end of overtime's shot-in-the-arm for wages.

NWLB will resist wage reductions. It will be sympathetic to wage appeals from war plant workers, giving fringe increases with the hope of making wages attractive enough to keep the plants staffed. In general, wages will continue to be geared to prices, and the anti-inflation line will still be there.

Annual Wage Doubts

The new administration is expected to be less favorably inclined toward the guaranteed annual wage program, a pet of the late President Roosevelt. The attitude is likely to be that it is not a matter for legislation, but must be left to collective bargaining. This will not be opposed by labor.

Washington Bulletin

No April Emergency

During April the War Production Board went along for the longest number of consecutive days since its creation during which no emergency calls were received from the armed services. The heat is off just a bit, though for understandable reasons it appears advisable to hold back any official announcement or expression about the prospective extent of cutbacks. Washington wishes to avoid any rush by war workers to go over into jobs that give more promise of postwar security.

The fact that the complete capitulation of Germany is close at hand is having a profound effect upon the attitude of Washington officialdom toward reconversion. The attention that reconversion is receiving is based on the well-founded belief that shortly after hostilities end in the Reich, cutbacks and cancellations will be substantially larger than any government agency at the moment is willing to admit. Official statements put the figure at 12 percent, but competent authorities say that conservatively it will amount to at least 15 to 20 percent. It may be considerably more.

Need Reconversion Action

The way that WPB handled the automotive situation is characteristic of what may be expected in other industries regarding reconversion. Motor car manufacturers were about to explode with indignation over WPB's lack of comprehension of the necessity for starting to build key machine tools now for production of postwar cars. Then Mr. Krug and his lieutenants, including Director John Chafee of the Tools Division, went to Detroit to meet the automotive brass hats face to face. The Detroit group was prepared to "let them have it" with both barrels, but that proved unnecessary, because both sides together went over the order boards of machine tool companies and the "go ahead" for essential postwar orders was given wherever it did not interfere with war programs.

Cars in 6 Months

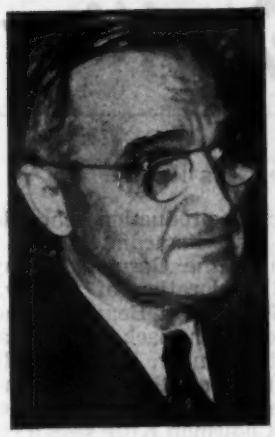
The abrupt change in Washington thinking is demonstrated by the opinion expressed in high WPB circles that within six months after V-E Day the automobile people will be turning out new cars at an annual rate of 2,500,000 to 3,000,000 units. WPB officials stress the fact that the automotive industry is not being singled out for preferential treatment. Other industries can expect similar treatment.

5-Phase Job

One prominent government official contrasts the reconversion task today with that in 1918, driving home the thought that there is very little similarity between the two. The job a generation ago was simple. The present job, he says, logically falls into five divisions. The first phase began more than a year ago. November, 1943, was the high point in employment in war plants. The decline since then has averaged close to 100,000 workers a month. This phase of reconversion will last up to V-E Day. The second reconversion phase will commence on V-E Day and will continue until the Japanese are defeated. In the first quarter after V-E Day 2,800,000 workers will be released from the war effort—2,100,000 directly from war industries; 400,000 from supporting manufacturing industries, such as shoes and textiles; and 300,000 from the armed services.

Of that number about 1,600,000 will be reabsorbed by business and industry. But, says this official, within six months after V-E Day we are likely to be faced by a tight manpower situation again, because assuming the Japanese war is still on, the war effort will require a large number of people and reabsorption of men into civilian production will be rapid. The third phase of reconversion will be ushered in by the collapse of Japan, the cancellations then being unusually severe. The fourth phase will consist of a consumer buying boom that may last three, four or five years. The final phase will come with the completion of the job of filling the pent-up consumer demand. The main task then will be to maintain the high employment that seems assured during the fourth phase.

New President



Harry S. Truman

Within a few weeks after taking office, President Truman won the confidence of the nation by reaffirming the nation's stand on war and peace, and effectively dispatching the many decisions he had to make in that time.

Portable Cutting Outfit—This new oxy-acetylene cutting unit, weighing 56 pounds, can be carried by the operator to almost inaccessible places, and used without having to be set down. Developed by the Navy for battle-damage use, this flame cutter may find many uses in maintenance work in industry after the war

Wallace on Surpluses

One of Truman's first acts was transferring surplus consumer goods disposal to the Department of Commerce from Treasury's Procurement Division. Since the latter used orthodox selling methods, some observers wonder what Wallace's agency will do in using surpluses to "assist domestic and foreign commerce."

Spotting the Air News

Plane Cuts Ready

Aircraft production schedule cutbacks start immediately with liquidation of the Germany Army and Allied declaration of victory. The War Production Board has not advertised its cutback program as VE-Day draws near, because it did not want to repeat the false alarm given before the battle of the Bulge. But WPB Chairman Krug says a cutback plan, under progressive improvement and change to match war trends, is ready for instant operation.

One feature of the cutback plan will enable aircraft manufacturers to negotiate with procurement officers as to when the reductions will begin, once the over-all signal is given. Some manufacturers who have plans for other production will want to cut airplanes immediately, others will wish to extend their reduced schedules as long as possible. WPB hopes that this option on the part of manufacturers will automatically bring production down.

Army Air Force Shifts

Meanwhile, Army Air Forces has announced a number of aircraft production changes in anticipation of VE-Day: (a) reduction of total airframe weight about 15 percent; (b) increased production of B-29, B-32, A-26, P-80, C-82, and C-54; (c) replacement of P-38 and other old fighter designs with new designs (presumably jets); (d) production of newer versions of the P-47 and P-51; (e) conversion of Buick plant at Melrose Park, Chicago, to other engine types (presumably jets) and termination of B-24 engine production; (f) conversion of Chevrolet plant, Flint, Michigan, to produce parts for the Buick plant; (g) curtailment of B-17 engine output by Studebaker at South Bend; (h) concentration of Allison at Indianapolis on jet engines for the P-80.

More Jet Planes

Acceleration of Lockheed's P-80 Shooting Star will take up much of the manpower slack resulting from gradual stoppage of P-38 and B-17 production. Lockheed also continues a Navy patrol bomber. Consolidated's present B-24 contract has been reduced by only two weeks of the total run. Boeing's B-29 program at Seattle and Renton is under constant pressure for increase. North American, Lockheed, and Douglas, are practically unaffected so far.

The major slash will hit the Army, of course, unless the plan of war against Japan is radically changed. Navy has just called for 19,140 planes in the fiscal year from July 1, 1946 to July 1, 1947. All would be combat types, more than half of them fighters. The cost will be $2,800,000,000 as compared with $2,900,000,000 in 1945. But Navy's airplane requirement is much smaller than that of Army. Navy gets about 2,000 planes per month and maintains a strength of about 36,000.

B-29 Output Levelled

The B-29 Superfortress program, whose priority is equalled only by that of jet fighter planes, will be levelled off at just over 400 per month on July 1. Bell at Atlanta is already at its peak of about 60 per month, as is Boeing Wichita at 100 per month. Martin at Omaha is going from 40 up to 60 per month, and Boeing-Seattle-Renton goes up from 80 to 180.

An important point of government policy will come up as aircraft and other war cutbacks are put into effect. The question will arise whether it is better to build airplanes that are not needed, consuming valuable materials, or to stop production and throw multitudes of people out of jobs. It can be argued that a separation bonus would be more economical than production of useless goods. And it can be argued that such bonuses are bad for the nation's morale. The question will be decided in Washington.

VE-Day Cutback Effects on Localities Studied by WPB

WASHINGTON—WPB is studying the effects that VE-Day cut-backs will have on various localities throughout the country. The job is being done by the Production Readjustment Committee, headed by Jack Small, which includes representatives of the procuring agencies.

The relative job loss involved in planned cut-backs and ability to convert such facilities to civilian type work is being analyzed. Questions being considered also include whether or not to close down a government-owned plant in a particular area where there is no other industry and allow the workers to migrate back to their homes, or to gradually reduce the work of such plants over a period of time. This factor will have an important influence on placing of cut-backs. Another consideration will concern a particular contractor's chances of reconverting and providing a large number of jobs upon cancellation of war contracts, as against another contractor's limited non-war potentiality.

Each locality is being studied, and reports on the probable situation in reconversion are being sent to the procurement agencies involved. The analyses are strengthened by actual experiences in various areas as a result of cut-backs.

B-29 Transport Counterpart—The Boeing C-97, transport counterpart of the B-29, is greater than all existing Army Air Force transports in range, payload and size. With a length of 110 feet and wingspread of 141 feet, the plane's two decks can carry 100 fully equipped troops

Machine and Plant Servicing Firms Must File Rates—OPA

WASHINGTON—About 65,000 concerns and individuals engaged in performing industrial plant and machinery services now under price control have been given until May 31, 1945 in which to file their service prices, rates and rate-computing reports with the Office of Price Administration. The previous deadline for filing these reports had been April 30, 1945.

Concerns and individuals affected whose revenues are below $75,000 annually must file this data with their OPA district offices. Concerns with revenues over $75,000 a year must also file reports with the Machinery Branch, Office of Price Administration, Washington 25, D. C. If any current pricing rates or methods differ from those used on March 31, 1942, an explanation of the differences must be given.

Bakelite Announces Two Films On Plastics Use and Design

NEW YORK—Bakelite Corp. has released the first two films in its Technical Film Library, as guides to the understanding of the proper uses of setting plastics. Technical Film No. 1, "Bakelite Plastics—Selecting the Right Thermosetting Molding Material," points out proper selections for particular finished products, while Technical Film No. 2, "Bakelite Plastics—Product Design and Molding Technique for Thermosetting Plastics," presents fundamentals of correct mold design and molding techniques for parts manufactured from these plastics.

Sixteen millimeter prints are available without cost upon request to Technical Film Library, Bakelite Corporation, Unit of Union Carbide & Carbon Corporation, 300 Madison Avenue, New York 17, N. Y.

UNION TROUBLE FORCES OLD MICHIGAN FIRM TO CLOSE

PORT HURON, MICH.—Officials of the United Brass & Plumbing Corp. liquidated the company on April 9th, because union demands and disturbances made profitable operations impossible. The company had been founded shortly after the Civil War, and was one of Michigan's oldest concerns. It had subcontracts from General Motors and Chrysler.

The UAW-AFL had the plant contract with the management, but the UAW-CIO tried to delay liquidation of the company by claiming that it had managed to sign up 60 percent of the employees.

Names in the News

Alfred E. Howse

Col. Alfred E. Howse was recently appointed administrator of the Surplus Property Board. Col. Howse's civilian background includes long experience in large-scale merchandising programs. Joining the Army in 1941, Col. Howse was soon placed in charge of organizing and developing the Army Air Forces national procurement operation and was responsible for staff supervision of all procurement, financing, renegotiation, warehousing and transportation activities for the Air Force.

Robert E. Cramer has been named chief engineer of the American Steel & Wire Co., United States Steel Corp. subsidiary, succeeding **E. J. Reardon,** resigned. Mr. Cramer has been with various of the United States Steel subsidiaries for the past 35 years.

Four new vice presidents have been added to the executive staff of the Packard Motor Car Co., Detroit, Mich., in its reorganization to consolidate direction of postwar car and engine projects. New officers include: **G. C. Reifel,** vice president of manufacturing; **L. W. Slack,** vice president and general sales manager; **H. J. Ferry,** vice president and secretary-treasurer; and **E. C. Hoelzle,** vice president and comptroller.

G. C. Reifel

L. W. Slack

W. O. Springer has been appointed manager of the Cleveland Steel-Service plant of Joseph T. Ryerson & Son, Inc. For the past 15 years, Mr. Springer has been in charge of the Cleveland Special Steels Div.

G. E. Porter, who has been associated with the General Electric Co., Erie, Pa., for the past 34 years, has retired as supervisor of tool equipment.

John L. Young has been elected to the newly created post of vice president in charge of engineering of the United States Steel Corporation's National Tube Co., Pittsburgh, Pa. Mr. Young has been vice president in charge of industrial research and development of the United Engineering and Foundry Co., Pittsburgh, with which he has been associated since 1936.

Henry C. Atkins has been elected vice president in charge of manufacturing of the E. C. Atkins & Co., Indianapolis, Ind. Mr. Atkins, who has been with the company for the past 23 years, has been superintendent for the past nine years. He will be succeeded by **William E. McCartney,** who has come up through the ranks during his 14 year association with the firm.

Henry C. Atkins

Harry T. Rowland

Harry T. Rowland has been elected first vice president of the Glenn L. Martin Co., Baltimore, Md., Mr. Rowland has been actively connected with the Martin organization since 1936.

Charles H. Cox, former general manager of the Enterprise Engine Co., San Francisco, Calif., has been appointed to the executive staff of Joshua Hendy Iron Works, Sunnyvale, Calif. Mr. Cox will be particularly concerned with the export sales division of the company.

W. E. Brainard, former tool planning supervisor, has been appointed chief tool engineer of Consolidated Vultee Aircraft Corporation's Vultee Field Div. Mr. Brainard, who has been with the Vultee Field Div. for over five years, succeeds **Dwight C. Jones,** resigned.

Harvey F. Stowers has been appointed special assistant to the president of the Aeronautical Chamber of Commerce of America, for western United States. In his new position, Mr. Stowers will assist in the Chamber's air power, personal aircraft and landing facility programs.

E. Peerce Lake

Carl L. Hecker

E. Peerce Lake, former vice president and general manager of the Warren City Manufacturing Co., a Graham-Paige subsidiary, Warren, Ohio, has been appointed general sales manager of Graham-Paige Motors Corp., Detroit, Mich. Mr. Lake, a veteran of 18 years with General Motors in various capacities, was vice president and general manager of the Columbia Machinery and Engineering Corp., Hamilton, Ohio, before joining Graham-Paige.

Carl L. Hecker, who has had wide experience with various automotive companies, has been named general works manager of the ACF-Brill Motors Co. plant at Philadelphia, Pa. For the past 12 years Mr. Hecker has been plant superintendent for the General Motors Truck and Coach Div., General Motors Corp.

Henry S. Freynik has been named chief metallurgist of the Riverside Metal Co., Riverside, N. J. Mr. Freynik has been associated with the laboratories of the company for the past 21 years.

C. A. Campbell has been appointed export sales manager of the Baldwin Locomotive Works, succeeding the late **Clyde G. Pinney.** Mr. Campbell joined Baldwin in 1919 and since Pearl Harbor has handled all government orders for Baldwin products as district manager in Washington, D. C.

E. D. Wolf has been appointed sales manager of the Michigan Broach Co., Detroit, Mich. He has been connected with the Detroit Broach Co. for several years and prior to that time with Ex-Cell-O and with Taft-Peirce Manufacturing Co.

Tracey V. Buckwalter, who for the past 25 years has served as chief engineer and vice president of the Timken Roller Bearing Co., Canton, Ohio, retired April 30. He will, however, continue in a consulting capacity.

C. E. Mason has been appointed technical director of the Bristol Co., Waterbury, Conn. For 16 years he was associated with the Foxboro Co. and during the past five years he has been director of engineering of the Mason-Neilson Regulator Co.

David Gordon, recently chief engineer for the Interchemical Corp., has joined the staff of Foster D. Snell, Inc., as director of engineering.

OBITUARIES

Edson J. Noble, 53, secretary and chief engineer of the Horsburgh & Scott Co., Cleveland, Ohio, passed away April 18. Mr. Noble has been associated with the Horsburgh company since 1919 in the executive positions he maintained until his death.

G. Tell Dubois, 55, district sales manager in Detroit of the Potter & Johnston Machine Co., Pawtucket, R. I., died April 3. Mr. Dubois, who has been connected with Potter & Johnston for nearly 19 years, was previously engaged in the manufacture of special tools.

BUSINESS ITEMS

E. H. Welker

Dorothy Kimmel

E. H. Welker and associates have purchased the **Ultra-Lap Machine Co.,** 247 McDougall Ave., Detroit 7, Mich. Officers of the new company include: **E. H. Welker,** president; **Norman Walker,** vice president and general manager; **Ernest P. LaJoie,** secretary and treasurer; and **Howard Hartness,** assistant secretary and treasurer.

Lempco Products, Inc., has formed an export company known as **Lempco-International. Dorothy Kimmel,** managing director of the new firm, was formerly export manager for Lempco for the past 15 years.

At a recent annual meeting of the stockholders of **Westinghouse Electric and Manufacturing Co.,** it was voted to split the company's stock on the basis of four new shares for each present one and also to change the company name to **Westinghouse Electric Corp.** for simplicity and brevity.

General Electric Co. has established an air conditioning department as one of the six major operating departments of the company. The new department will have its headquarters at Bloomfield, N. J., where its operations will pertain to heating, air conditioning and commercial refrigeration. **George R. Prout** has been named general manager of the division.

Hyster Co., Portland, Ore., and Peoria, Ill., has appointed **James A. Roach** as factory representative to cover the Atlantic seaboard states with headquarters at the New York office, 90 West St.

Kobe, Inc., has established a general technical service department under the direction of **W. F. Slater,** who will be in charge of all the company's technical field activities.

Sterling Tool Products Co., Chicago, Ill., has acquired an additional 19,000 square feet of floor space at the location of the present Sterling factory, 363 E. Ohio St., to increase present production and for postwar expansion.

Pacific Engineering Corp. has transferred its sales division from the plant at 3123 San Fernando Rd., Los Angeles, Calif., to suite 1100, Equitable Building, Hollywood.

The **Landis Tool Co.** has opened offices in the Singer Bldg., 149 Broadway, New York 6, N. Y., with **Walter P. Lotz,** newly-appointed eastern sales manager, in charge.

Bruening-Winans Corp., Rochester, N. Y., has changed its corporate name to the **Bruening Products Corp. W. R. R. Winans** has resigned from the firm and **William H. Bruening** has been named president. Other officers include **W. L. Bruening** and **T. Scherwin** as vice presidents.

Towmotor Corp. has named **Roy E. Madden** as district sales and service representative for the Chicago area with headquarters at the office and warehouse at 6321 So. Wentworth Ave.

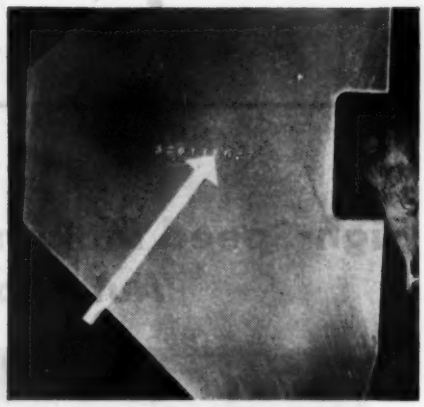
Thomas J. Redmond has been appointed Detroit sales representative for the **F. J. Stokes Machine Company** of Philadelphia, Pa.

The Taft-Peirce Manufacturing Co., Woonsocket, R. I., has appointed **Arthur R. Shevlin** as sales agent in eastern New England with offices in the Park Square Bldg., Boston 16, Mass.

Master Die Eliminates Numbering Operation

1 The operator arranges the movable strips in the master die until the desired arrangement is in line; strips are locked in place by the recessed-head screw at the right. The number plate is placed over them, and the steel block at the left is swung over it. Pressure applied to the block in a punch press transfers the line of numbers to the plate.

2 The number plate (⅜ in. wide and 2 in. long) now has the identifying numerals embossed on its surface. The next step is to cement it into the desired position in the blanking die. Thus, when sheetmetal aircraft parts are stamped, the numbering operation is done simultaneously. Formerly, numbers were added separately in a special machine.



3 Here is a stamping as it comes from the blanking die with the numbers already on it. By eliminating the addition of digits and letters as a second operation both time and money is saved. The process can be applied to 24R and 24ST sheet aluminum. The die was conceived by Joseph Churton at Consolidated Vultee's San Diego plant.

Plain Indexing on a Dividing Head Without Using a Reference Table

BY W. A. ROBERTS

THIS IS A METHOD for finding the proper hole circle and the correct number of spaces to use with a standard 40 to 1 ratio dividing head without referring to a table.

If we have an index plate with the same number of holes as we wish to have divisions, there will be 40 holes in the index plate and each space will be one-fortieth of the circumference.

Say, we have a 36-tooth gear. With a 36-hole index plate we index 40 spaces, for this reason—the gear ratio is already 40, so once around will be 36 holes, which is one-fortieth of a circumference, and four more spaces are one-ninth times one-fortieth, the total equalling ten divided by 360, or one thirty-sixth of a revolution, say ten degrees. The same can be done with a 72 hole circle; our index is 80(2×40) and 72 is twice 36, we would go once around plus eight more. An 18-hole circle could be used by going once around plus two holes. For a 27 hole circle, once around plus three holes will give the same result. The ratio of 40 divided by 36 holds in each case, so any hole circle divisible by 9 can be used.

If a prime number is to be utilized, then the hole circle must be a multiple of the prime number. Prime numbers are those divisible only by themselves, because other numbers would not come out even but would leave something over.

Another application of simple indexing is dividing the circle into degrees or fractions of a degree.

For simplicity, let's take whole degrees first. The dividing head has a ratio of forty, one revolution of the hole circle would give 9 deg., if a 9 hole circle is employed, each hole would be equal to one deg.; an 18 hole circle would divide the circle into half degrees, and multiples of 9 would show correspondingly smaller parts of a degree if individual holes are used. If 7 holes of a 63 hole circle are taken, we get one degree, but if single holes are utilized, we have one-seventh degree, because 7 times 9 equals 63. For 13½ deg., an 18 hole circle is selected, because each hole equals a half deg.; 13½ deg. equals 27 half degrees, then we make one revolution and nine holes more, giving 27 holes in all, each hole spacing off a half degree. Multiples of 18 can also be chosen. For a 54 hole circle, we turn one full revolution plus 27 more holes. If we want one-third of a degree, then we pick the 27 hole circle, because once around the circle is nine deg., and 27 is three times 9, so each hole will make 9 deg. divided by 27 or one-third degree.

Powder Metals Again

ONE OF THE latest wrinkles in powder metallurgy involves surrounding a cheap core with tungsten carbide to achieve great resistance to frictional wear or erosion by hydraulic fluids. The experimental method, is: The core and carbide charge are put in the die, the upper plunger compacts the charge against the lower plunger; finally, both plungers (still gripping the piece) move down through a sizing die. After ejection, the compact is sintered and the core is heat-treated at the same time.

Shop Equipment News

High-Speed Molding Press Has Automatic Cycle Controller

French plastics molding press

A plastic molding machine, which is suitable for use in transfer or compression molding operations, is a self-contained unit with the hydraulic pumping equipment built into the base of the machine. The French Oil Machinery Co., Piqua, Ohio, manufactures two models of the machine, a 100-ton press and a 200-ton press, both equipped with full cycle controls.

The power requirements of both machines have been kept to the minimum for the pressures delivered. The 100-ton unit is powered with a 5 hp. motor and the 200-ton unit with a 7½ hp. installation.

Each unit is equipped with a fully automatic cycle controller to suit the requirements of various methods of molding. Timing intervals and operating cycles can be changed and adjusted by the conveniently located control panel. The units will develop high pressing speeds when used in conjunction with high-frequency induction pre-heating units.

Heating and Quenching Unit Combined to Harden Gears

The Lepel Roto-Heating and quenching unit was developed for the purpose of hardening and quenching of gears and blanks in conjunction with high-frequency induction heating converters manufactured by Lepel Laboratories, 39 W. 60th St., New York 23, N. Y. It comprises the load coil, the quench ring and the motor-driven rotating mechanism, and assures uniform heating and quenching of the parts at all times.

The desired depth of hardness of the work part may be controlled by the heating time cycle and the amount of power selected from the converter. On most conventional types of gears made of low-carbon or alloy steels, the surface to be hardened is generally confined to the contour of the gear tooth, allowing the core of the gear tooth to retain its initial toughness and ductility.

The Roto-Heating unit is usually placed in a tank having drainage facilities for the waste water. A lever arrangement is provided to facilitate loading and removal of the work parts.

Interchangeable quench rings having inside diameters of 2, 3¼, 4¾, 6, 7 3/16 and 9¾ in. are available. The largest ring can accommodate a gear 6¾ in. in diameter and 2 in. thickness.

A water pressure of about 20 lb. is satisfactory for the smaller quench rings whereas 40 to 60 lb. of pressure is required for the larger sizes. Water flow through the quench ring is controlled by means of a solenoid valve, and the complete heating and

Lodge & Shipley Lathes *at work*

ON TOOLROOM AND EXPERIMENTAL WORK at Clark Equipment Co.

● You can't sit still in the truck industry or in any industry in product design, metals, production techniques . . . or lathes.

To obtain best results at the Clark plant, Buchanan, Michigan, the new, advanced-design Lodge & Shipley 20" Lathe is used for both experimental and developmental work and to produce intricate dies.

By equipping this lathe with a Lodge & Shipley contour turning attachment, Clark obtains still further advantages—for example, boring extruding dies to reduce the size of tubing for rear axle housing manufacture.

Completely new from headstock to tailstock, the new 18, 20, and 22" L & S Lathes quickly prove their unequalled adaptability, assure better and greater output at lower cost. Ask L & S Engineers for a demonstration on your work.

For detailed literature write for booklets Nos. 606, 622.

Shown above are a few of the many products Clark makes which are machined on Lodge & Shipley lathes: axle housings, drills and reamers, gears and forgings, front and rear axles.

THE LODGE & SHIPLEY MACHINE TOOL CO.

CINCINNATI 25, OHIO, U. S. A.

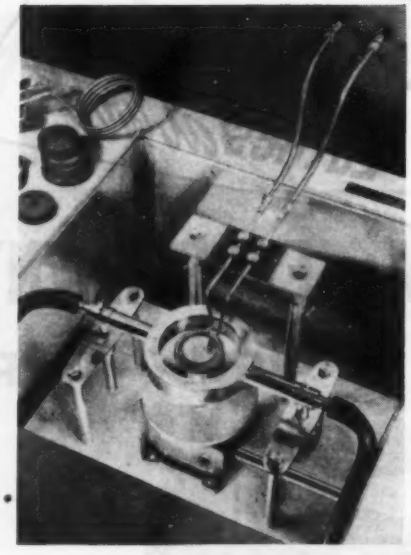
L & S LATHES

ENGINE — TOOL ROOM — AUTOMATIC — OIL COUNTRY LATHES

quenching cycle is regulated by an automatic timer which terminates the heating cycle at a precise moment and starts the quenching for a pre-determined period.

The rotating mechanism within the quench tank is driven by a ¼-hp. 60-cycle motor. This motor, mounted outside the quench tank, is connected by means of a flexible coupling to the Roto-Heating unit.

The unit can be used with any Lepel converter, made in standard sizes of 4 kw, 7½ kw, 15 kw and 30 kw. The power required for the operation of the Roto-Heating unit is governed by the size of the gear to be treated. The frequency range of the Lepel Converter is variable from 150 kc. to 450 kc. The operating frequency of the load coil is governed by its impedance.



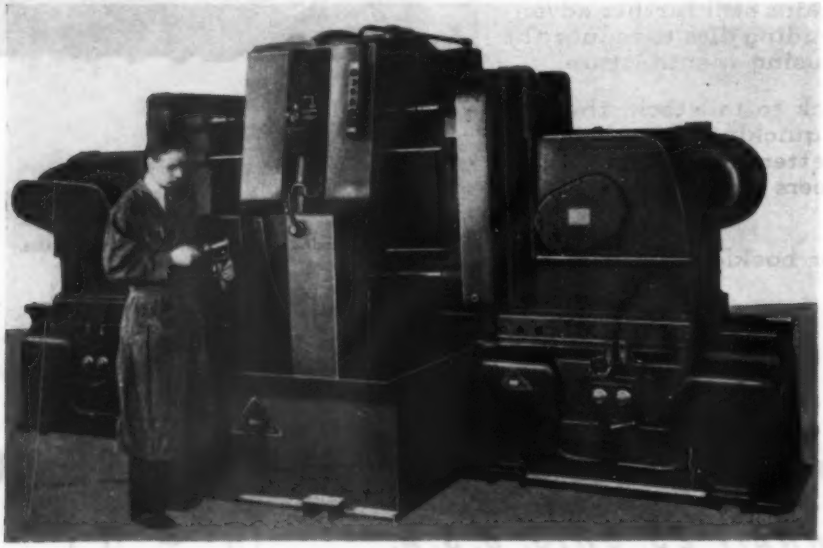
Lepel Roto-Heating unit

Special Machine Drills, Reams And Chamfers Universal Yokes

A special two-way trunnion type machine for drilling, chamfering, and reaming yokes for universal joints has been designed and built by LeMaire Tool & Mfg. Co., Dearborn, Mich. The machine is capable of accommodating sizes ranging from ⅞ to 1½ in. in diameter. By reaming from two directions, each tool does half the work. In addition to achieving line-reaming accuracy, production is stepped up. The reamers are driven by a special quill-type spindle built in the trunnion, with power transmitted from the multiple head through a flexible drive.

The machine consists of a manually operated six-station trunnion mounted on a fabricated base on which are mounted two standard LeMaire self-contained slide-type hydraulic units. Change gears provide various spindle speeds for the five-spindle drill heads.

All operations of the machine are controlled by a 5-button single-station control. Individual adjusting controls are provided at machine elements.

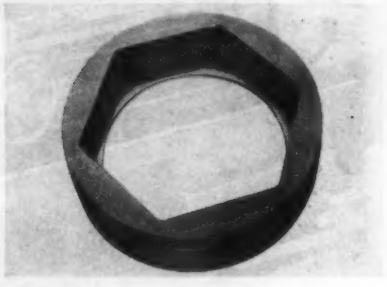


LeMaire trunnion-type machine

Cylinder-Type Grinding Wheel Has Hexagonal Coolant Space

A cylinder-type grinding wheel with hexagonal hole or inside diameter, known as the "Hexilinder," is a product of the American Emery Wheel Works, Richmond Square, Providence 1, R. I. The wheel, 18 x 5 x 2 in. rim, is designed to take heavy cuts with low power consumption due to the shearing action of the cutting face.

The Hexilinder grinding wheel is said to function equally well on steel or cast iron, the hexagonal inside diameter of the wheel providing for proper distribution of the coolant and thereby reducing to a minimum the heat generated. The wheel is designed for mounting on a standard Blanchard surface grinder without extra equipment.



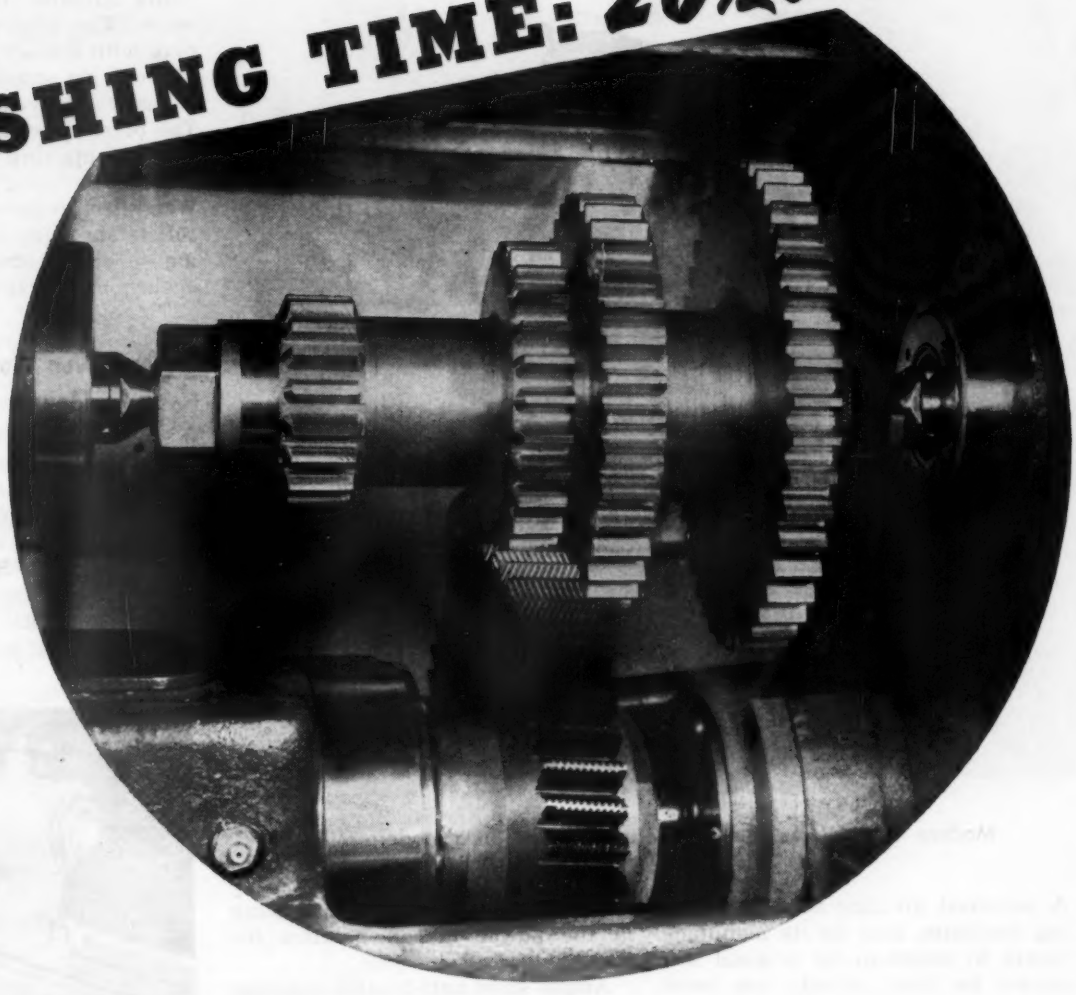
Hexilinder grinding wheel

Twin-Fluted Countersinks Operate Without Chatter

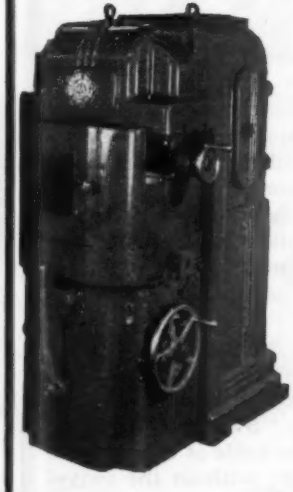
An addition to its line of chatterless countersinks is announced by the Grobet File Co., 321 Canal St., New York 13, N. Y. These twin-fluted countersinks are recommended for cutting aluminum, magnesium, steel, plastics, and plywood. They give a smooth microinch finish and also are adaptable for coarser work such as brake linings. The countersinks are made of high-speed steel, ground after hardening.

There are eight twin-fluted countersinks to the set, giving a range of six sizes with duplicates in two sizes. A perfect chamfer is made with these tools, free from ridges or chattermarks and accurately uniform in all cases, according to the manufacturer. They come in a hinged box of polished wood with an individual pocket for each size. The standard set is made with 82-deg. angle, but Grobet twin-fluted countersinks also may be obtained with 90- and 60-deg. angles.

FINISHING TIME: 20 seconds



With UNDERPASS Shaving



Even close shoulder gears like this one represent no finishing problem when underpass shaving is used, particularly with the improved type underpass cutters now available with Michigan equipment.

The gear being shaved is a 27 tooth, 22½° P. A., 7 NP. The same manufacturer finishes similar close shoulder 18 tooth and 33 tooth gears in 18 seconds and 24 seconds respectively. Allowing a loading time of even 15 seconds, production capacity is around 2 gears a minute.

In underpass shaving, finishing is at exact center distance, feed of the cutter being tangential. Usually a single reciprocation, from front to back and return, or vice versa, is sufficient to finish the gear.

For Machine details ask for Bulletin 860-A-44

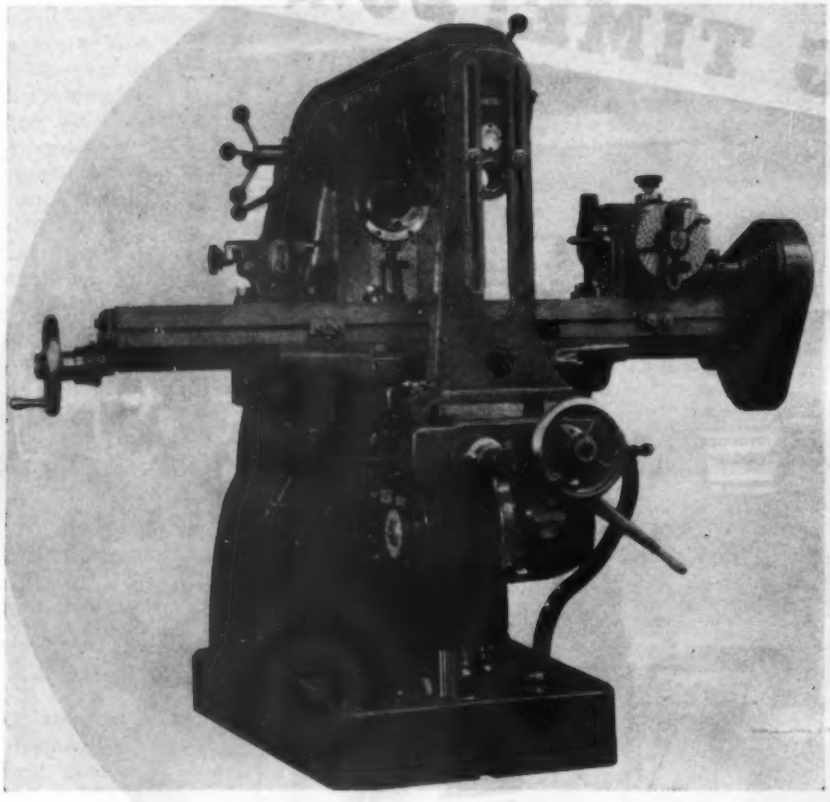
BUY U.S. BONDS STAMPS

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS ROAD DETROIT 12, U. S. A.

ORIGINATORS of GEAR SHAVING

Universal Dividing Head Accurate For Long Periods of Constant Use



Modern Tool Works dividing head mounted on a Modern Miller

A universal dividing head for milling machines, said by its manufacturers to maintain its original accuracy for long periods, has been introduced by Modern Tool Works, Ltd., Montcalm Avenue, Toronto, Ontario. A rigid optical inspection check is used to assure that the dividing head has an error for circular spacing not exceeding plus or minus one minute of arc at any setting.

The long life factor is attributable to the use of "Cone-Drive" gearing, in which large area of contact is obtained between the teeth of the pinion and worm gear. The net effect of this design is to distribute the load over a larger area per tooth and also over more teeth, resulting in lower unit loading of the gearing and decreased wear. An added advantage of the design is that the meshing gearing carries the lubricant into space between the teeth rather than forcing it out.

The dividing head is offered especially to tool plants which manufacture spiral or helical milling cutters, reamers and similar products. Change gears for spiral or helical milling are provided for mounting in the power takeoff gearbox for the dividing head.

Ample sized anti-friction bearings are provided throughout. The Cone-Drive pinion shaft is mounted on double-row ball bearings at both ends.

Dublife gage

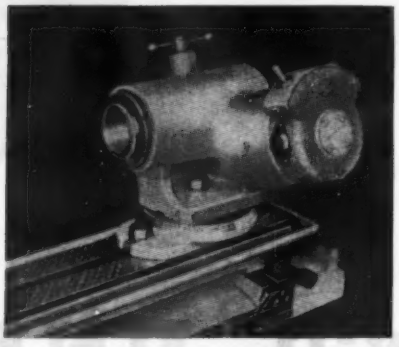
Plastic Collets Colored for Instant Gage Identification

Tough, light and enduring colored plastics are used by United Precision Products Co., 3524 W. Belmont Ave., Chicago 18, Ill., to make the Dublife gage, in which metal collets are replaced by colored plastic collets—green for the "Go" plug and red for the "No Go" plug. As both these plugs are contained in the same handle of the reversible plug gages, the user has instant eye information on the plug to be used.

The plastic collets have been found superior to metal in many ways. The plastic collet grips the plug with a much more secure hold. There is no slipping of the plug. It is easily removed by use of a drift. The plastic does away with scratching and marring of the plug, preserving its accuracy much longer. Weight is reduced by the plastic collets and they are dielectric, adding to the protection of the gage against electrical effects.

Motor-Driven Work Spindle Mounts on Tool Grinders

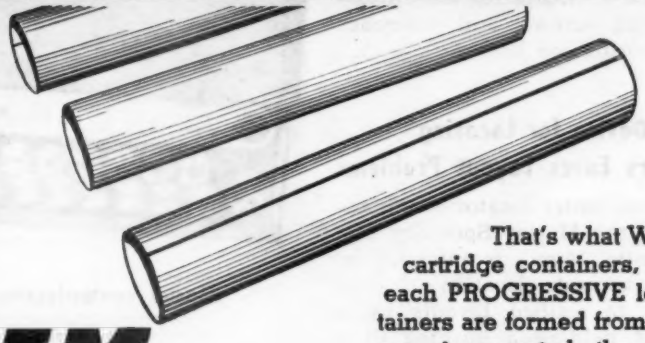
A self-contained motor-driven workhead, which is built for use on any make of tool grinder, is a product of the K. O. Lee Co., Aberdeen, South Dakota. It is constructed with a No. 11 B & S tapered spindle, hardened and ground, and mounted in ball bearings. The spindle will receive chucks, collet fixtures, face-plates and other standard work-holding equipment.



Lee workhead

The built-in drive motor, which is of the universal type, is provided with a conveniently located reversing switch and is fully protected against intrusion of chips, oils and dirt. The unit is easily mounted and is held in position by means of two T-bolts that are fitted into two slots on the lower section of the swivel base.

The fixture is mounted on a detachable swivel base which is graduated in degrees and permits 360 deg. rotation. Swing or center-height over the table is 8¼ in. with the swivel base; without the swivel base, the swing is 6¼. The unit measures 7 in. wide, 6½ in. long and 7¾ in. high. Its weight is 20½ lb. including the motor.



SEAM WELDING at 15 ft. per MINUTE

That's what Western Stove Works is doing on 18 gage M-16 cartridge containers, with an output of 90 containers per hour on each PROGRESSIVE longitudinal 200 KVA seam welder. The containers are formed from flat stock, rolled up and lap welded. Fixtures are air operated, the clamping action accurately gaging the lap before welding.

Other operations performed by Western Stove on these containers include projection welding the base sub-assemblies at 600 per hour on a PROGRESSIVE projection welder; welding cover locking rings to the body, tack welding the bottom to the body and spot welding the chimb rings to the body—all on a battery of PROGRESSIVE 50 KVA spot welders. The 10 gage bottoms are seam welded to the containers on 150 KVA PROGRESSIVE circular seam welders at 120 assemblies per hour per machine.

These are just typical of one plant in which resistance welding is used to turn out materials faster, better and at lower cost. For 100 examples of "RESISTANCE WELDING AT WORK" ask for 60 page book: No. WP-44.

PROGRESSIVE WELDER CO.

SEAM PROJECTION & BUTT . . . *Electric Welding Equipment* . . . PORTABLE GUN & PEDESTAL

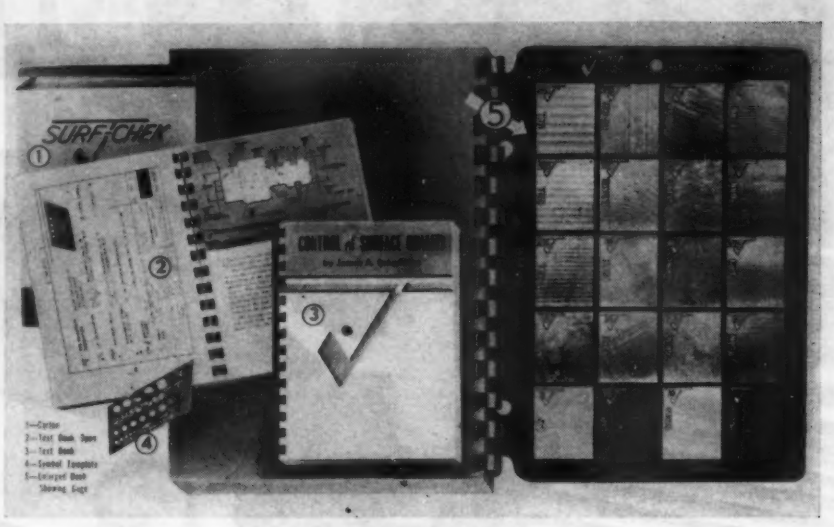
3050 E. OUTER DRIVE • DETROIT 12, U. S. A.

Roughness Standards Provide Quick Check for Surfaces

To meet the trend toward increasing uniformity in surface control, Surface Checking Gage Co., Hollywood 28, Calif., has produced the Surf-chek roughness standards, a development of J. A. Broadston at North American Aviation, Inc.

The kit contains a 65-page educational text bound to a gage consisting of 20 replicas of machined surfaces, prepared by turning, grinding, milling, honing, lapping and polishing, which vary in roughness from 500 to 5 microinches. The replicas are molded into a 5 × 7 in. plastic plate through the use of precise die inserts.

In the past, finish designations expressed only individual opinions. The Surf-chek method of designation eliminates guess interpretation, conveys the engineer's specific instructions to the machinist, and enables one to make rapid roughness comparisons.



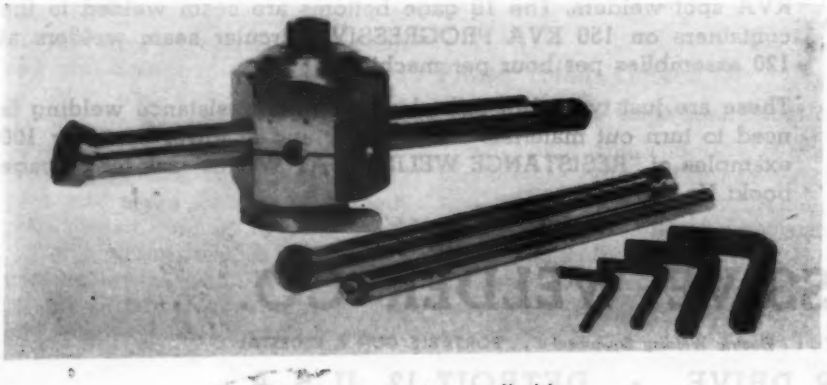
Surf-chek roughness standards

Boring Toolholder Uses Bit That Cuts by Shearing Action

The precision toolholder manufactured by the Shearcut Tool Company, South Bellingham, Wash., is made in five sizes to be used with lathes and screw machines from 10 to 26 in. swing. Each toolholder is furnished with three boring bars, one of which is arranged for turning small sizes. In the larger sizes two bars are arranged for turning as well as boring. The toolholder is made to toolmakers' tolerances and finish.

The circular Shearcutter boring and turning tool gives from 20 to 50 new cutting edges by rotating to a new position on its holder until re-sharpening is necessary. Tool life is increased several hundred per cent, and it is stated that each Shearcutter cutting bit pays for itself in the saving of grinding time before regrinding is necessary. Regrinding is an operation which seldom takes more than one minute, due to its symmetrical circular form.

Shearcutter boring toolholders, in boxes, are shipped complete with three boring bars, six Shearcutter bits, three wrenches for the cutter-bit holding screws, and wrenches for the boring bar holder.

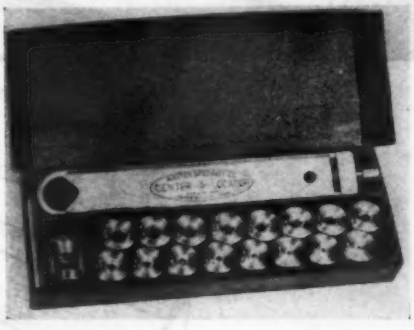


Shearcutter boring toolholder

Optical Device for Locating Centers Eases Layout Problems

The optical center-locator, manufactured by the Master Specialty Co., Minneapolis, Minn., is intended to simplify accurate location of drill bushings to scribed layouts by a means of holding a bushing to a center located by a magnifier.

After the work has been laid out by means of a vernier height gage and a surface plate, the compound magnifier is clamped into the holding fixture and it is then slowly moved over the intersecting layout lines. Once the reference circle, which is etched on the sight glass, is exactly centered over the layout lines, the holding fixture is clamped to the work. The magnifier is then removed from the holding fixture and the correct size drill bushing is substituted.

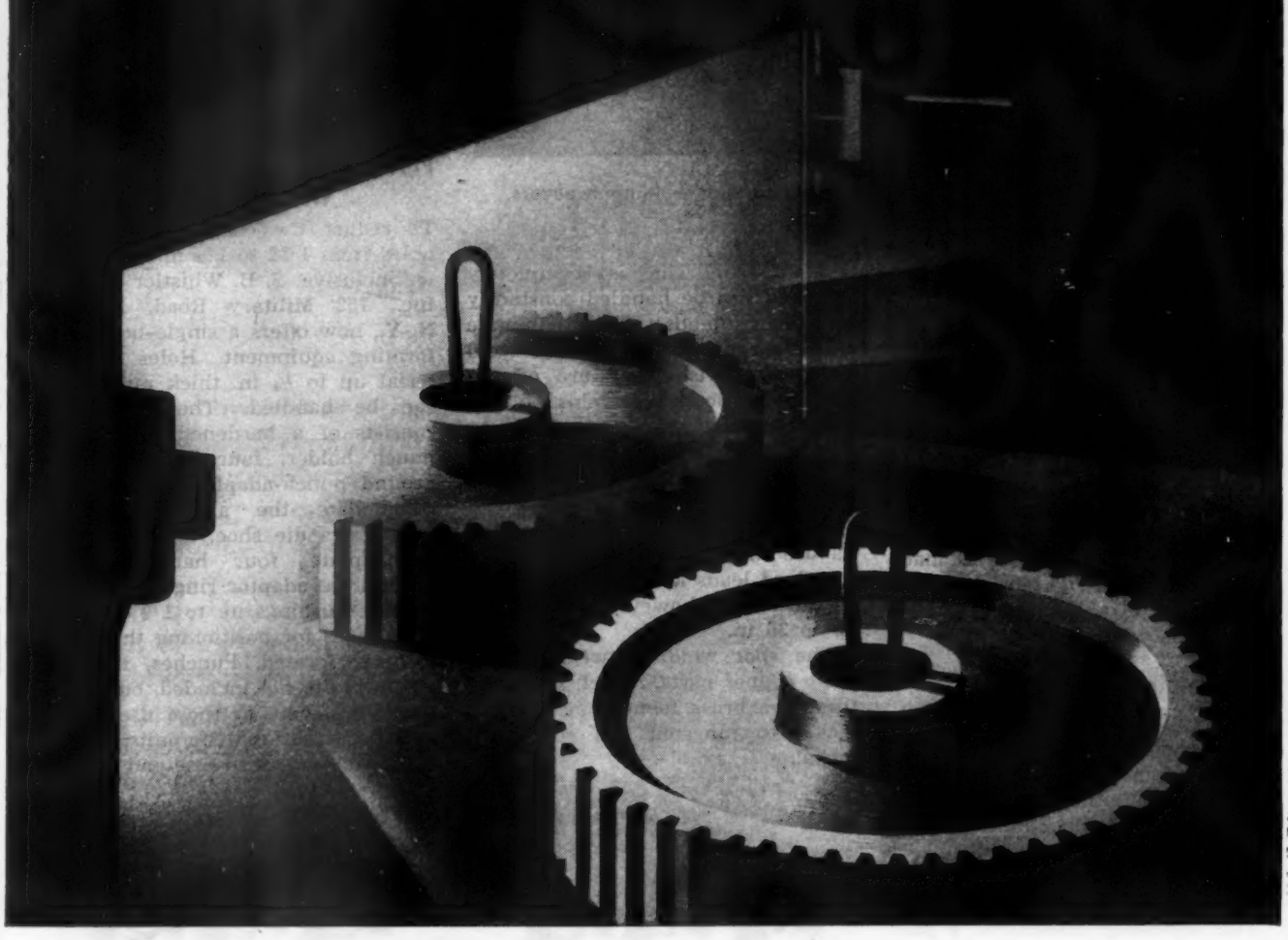


Master center-locator

All drill bushings are hardened, then precision ground to be concentric. The outside diameter of each drill bushing is exactly the same as the diameter of the lower magnifier ring which contains the sight glass on which the reference circle is etched. When a drill bushing is substituted for the magnifier in the holding fixture, the center of the bushing is precisely located over the intersecting layout lines. Holes can be located and drilled within an accuracy of 0.001 in. The work is usually placed on parallel bars to facilitate alignment of the bushing and the drill.

The set of sixteen bushings, with a sight glass and holder, is packed in a lined case.

Molybdenum steels require relatively high tempering temperatures and therefore are relatively free from internal stresses.



CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

ARMY E NAVY

MOLYBDIC OXIDE, BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

Climax Molybdenum Company

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MOLY

Protractor Center Head Has Punch and Level Attachment

The Boyce centering head, manufactured by the Eastern Research & Engineering Co., 37 Pearl St., Boston 10, Mass., is a punch making type center head. It is equipped with a level and protractor for marking cylindrical objects at angles which may be selected by the 2½ deg. protractor divisions. The leg ends are finished to provide a base for measuring the declivity of a flat surface. The punch is made of ⅜ in. drill rod and hardened. The body is cast of aluminum.

Boyce centering head

Spot Welding Tweezers Aid In Uniting Small Parts

It is possible to unite tiny elements of a product by probing for the parts, holding them and welding with the Besco spot welding tweezer, a product of the New Jersey Jewelers Supply, 280 Plane St., Newark, N. J.

This accessory consists of a pair of forged copper tweezers with plastic-covered copper leads terminating in a pair of lugs which connect in place of regular welding electrodes. Instead of carrying parts to be welded to the welding equipment, the electrodes are applied directly to the elements to be joined. They operate on from ½ to 1 kva. on 10 amp. current, and are used with a timer which cuts the current and times the length of the weld.

The copper jaws are held like any ordinary pair of tweezers. They are brought in contact with the parts to be welded; these are lightly brought together; the foot switch is pressed, current applied and the weld is made. They are completely safe and can be handled constantly with bare hands. They eliminate oxidation, produce a cleaner weld on small parts. They are offered for quick successive welds on one product where space is limited. As many as 4,000 welds per hr. have been obtained. The tweezer points require touching up only once a day. The flexibility of the device permits its use in practically any position. Standard leads are 18 in. They can be furnished, however, with leads up to 36 in.

The spot welding tweezers will unite copper parts, nickel, steel, tin, tin alloys, brass, monel, zinc, bronze, nickel to tungsten and copper to nickel.

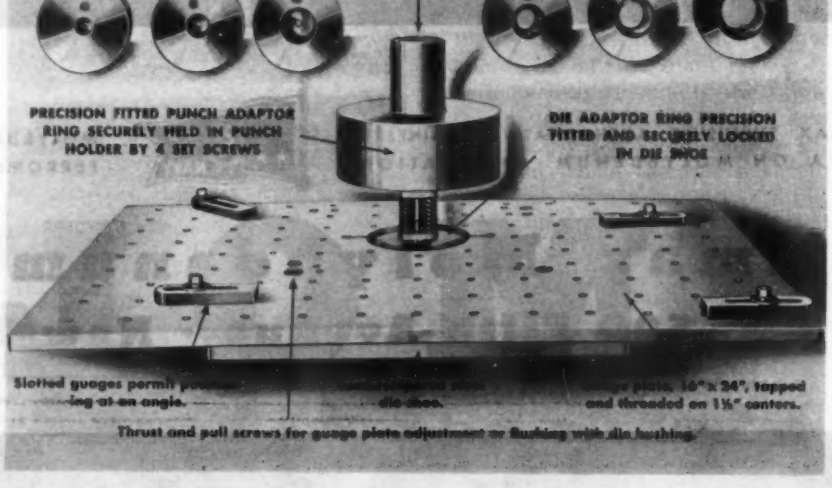
Besco spot welding tweezers

Carbide Inserts Increase Life Of Shot and Sandblast Nozzles

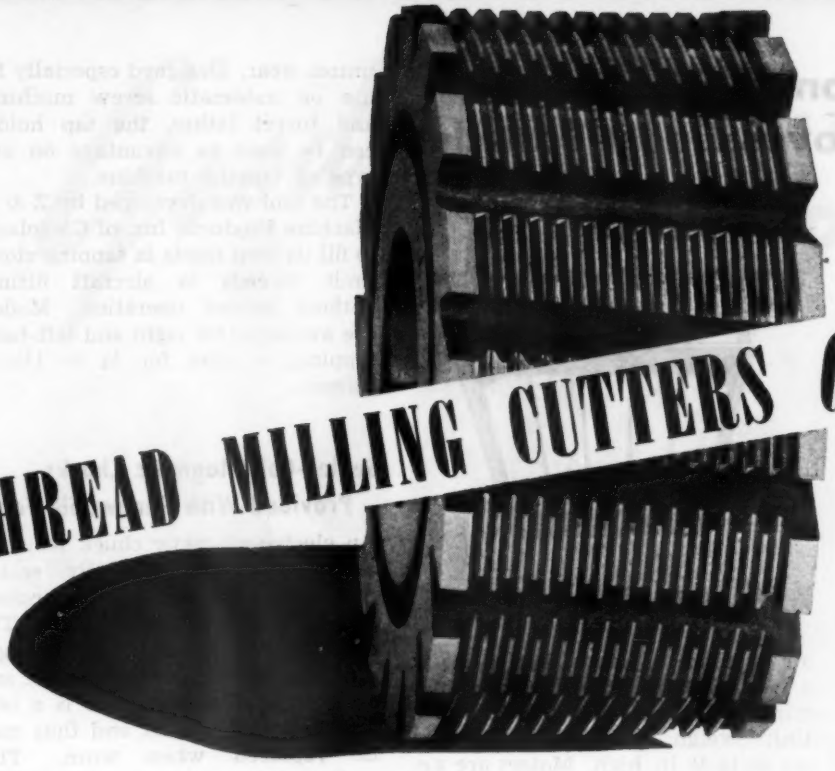
Longer service life of nozzles for sand and shot blasting arise from two improvements made by the American Foundry Equipment Company, 555 S. Byrkit St., Mishawaka, Ind. Inserts of "Norbide" borium carbide constitute the main improvement, but the company is also using a jacketing made of abrasion-resisting alloy steel. As a consequence, the company states that the improved nozzles are guaranteed for 1500 hours of service when used with steel shot or grit and 750 hours when used with silica sand. Decreased air consumption is also claimed.

Perforating Costs Reduced by Whistler Single-Hole Unit

To reduce the cost of perforating holes from 1/32 to 1½ in. in diameter inclusive, S. B. Whistler & Sons, Inc., 752 Military Road, Buffalo, N. Y., now offers a single-hole perforating equipment. Holes in material up to ¼ in. thick mild steel can be handled. The equipment consists of a hardened, alloy-steel punch holder, four hardened and ground punch-adaptor rings to accommodate the above sizes of punches, a die shoe, a 16 x 24 in. gage plate, four hardened and ground die-adaptor rings to accommodate bushings up to 1½ in., and four gages for positioning the sheet to be perforated. Punches, dies and strippers are not included, but these parts, the same as those used with Whistler adjustable die units, can be supplied in standard sizes and shapes.


PUNCH HOLDER OF HARDENED ALLOY STEEL
PRECISION FITTED PUNCH ADAPTOR RING SECURELY HELD IN PUNCH HOLDER BY 4 SET SCREWS
DIE ADAPTOR RING PRECISION FITTED AND SECURELY LOCKED IN DIE SHOE

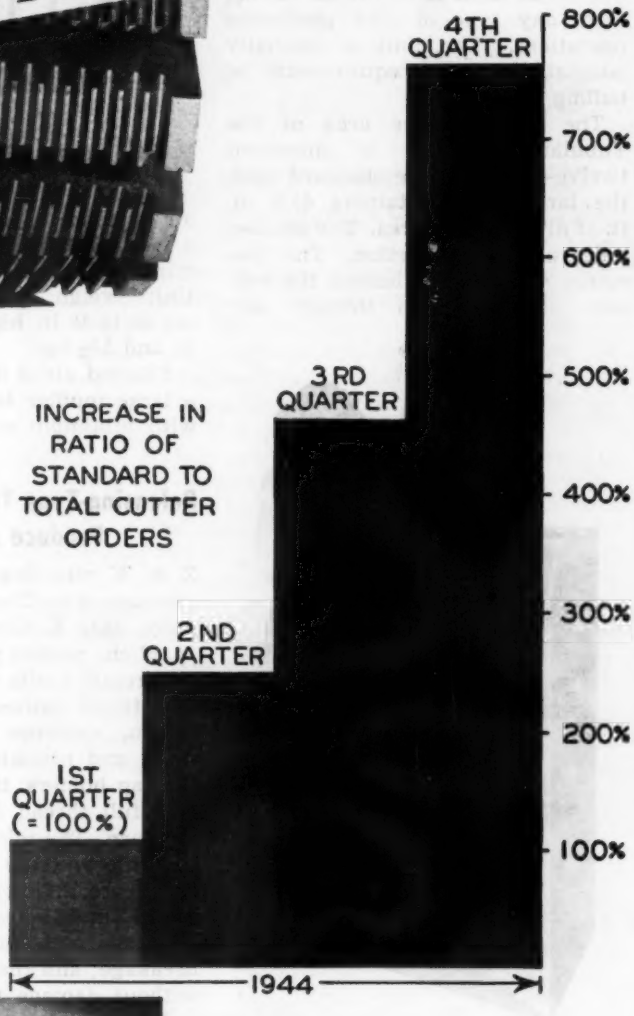
Whistler single-hole perforator as shipped, less punch, die and stripper



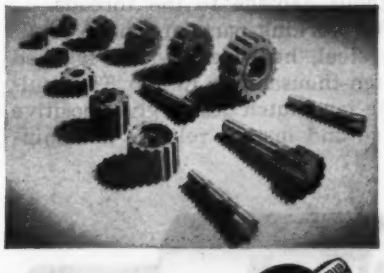
THREAD MILLING CUTTERS GO STANDARD

The story of how industry during 1944 took to the idea of specifying STANDARDIZED thread milling cutters, ground from standard blanks, carried in stock, is one of the big thread-production stories of 1944.

Introduced by Detroit Tap and Tool Company initially as an "expedient" to speed up deliveries (*) of thread milling cutters, these standardized-design tools are rapidly becoming standards of industry. Blanks for such cutters are carried in stock finish machined and heat-treated, ready for thread grinding. All that is necessary is to specify the thread desired and the blank number, saving time not only in delivery but also in preparing to order.



We will be glad to send you a Bulletin showing standard blank sizes and types carried in stock and giving complete ordering information. Ask for Bulletin No. CB-43.



*Despite the rapidly increasing demand for such tools, delivery time on Standard cutters was actually less at the end than at the beginning of 1944.

THREAD HOBS & SPECIAL THREADING TOOLS

DETROIT

GROUND TAPS, THREAD GAGES SPECIAL TAPPING MACHINES

8432 BUTLER AVE. DETROIT 11, U.S.A.

Tubular Construction of Filter Unit Removes Finest Particles

Applying the principle of reducing the ratio of air volume to filter surface area, the Tubular Dustex dust collector, manufactured by the Dust Filter Co., 160 N. La Salle, Chicago 1, Ill., is portable and self-contained and designed to meet the need for an efficient means of removing any kind of dangerous and obnoxious dusts from the air arising from any type of dust producing operations. The unit is specially adaptable to the requirements of buffing machines.

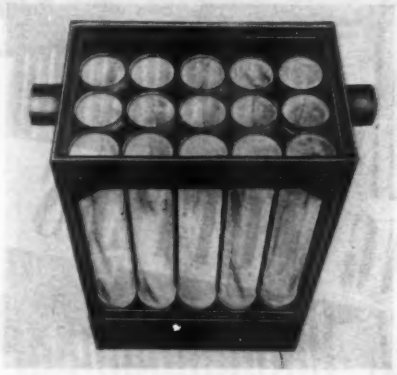
The filter surface area of the Tubular collector is increased twelve-fold over the standard unit, the large unit containing 48.8 sq. ft. of filter surface area. The smaller units are in proportion. The immense surface area lessens the volume of air drawn through any

Tubular Dustex dust collector

portion of the filter at one time thus preventing minute particles from filtering through. It also diminishes the static pressure loss usually caused by large quantities of dust impinging on the surface area.

No collector bags are used in the unit. The filter surfaces are tubular in design and are bottomless. Dust filtered through them is collected in a pan at the bottom of the unit.

The collector maintains a static



Filter sleeves are open at bottom

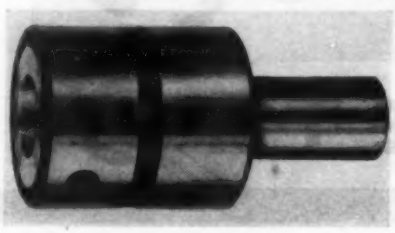
air pressure of more than 4 in. at a velocity of over 5,000 linear ft. per min. It is completely fireproofed. Units weigh from 150 to 250 lb.; are 36 to 48 in. high. Motors are a.c. ¾ and 1½ hp.

Filtered air is discharged through a large muffler to deaden air noise with minimum resistance.

Releasing-Type Tap Holders Produce Accurate Threads

Z & W releasing-type tap holders, announced by Champion Sales Company, 2832 E. Grand Blvd., Detroit 14, Mich., permit production tapping to aircraft limits on both automatic and turret lathes. Because of the design, extreme rigidity, positive drive and precision construction of the tap holders, the first thread out is a full thread instead of tapered or sharp. The release point is highly accurate and the tap rotates freely on release, giving positive depth control. Blind holes are successfully bottomed with minimum risk of tap breakage; and the tap is withdrawn without damage to the threads.

All working parts are made of alloy steel, heat-treated and finished to ten-thousandths limits. The multiple-jaw clutch design gives positive drive and instant release, and minimizes wear. Designed especially for use on automatic screw machines and turret lathes, the tap holder can be used to advantage on any type of tapping machine.



Z and W tap holder

The tool was developed by Z & W Machine Products, Inc. of Cleveland, to fill its own needs in tapping close-limit threads in aircraft fittings without second operation. Models are available for right and left-hand tapping, in sizes for ¼ to 1½-in. threads.

Sealed-Coil Magnetic Chucks Provided With Renewable Faces

An electro-magnetic chuck which is activated by hermetically sealed coils is a product of the Hanchett Mfg. Co., Big Rapids, Mich. The coils are fully sealed in air-tight plastic cases and are waterproof and shockproof. The faceplate is a separately attached part and thus may be replaced when worn. This method of construction permits a

Hanchett Hermeti-coil chuck

fully protected coil body and lowers maintenance cost by providing for chuck face renewals. The chucks are made of low carbon steel for greatest magnetic flux and are designed to withstand extreme external pressures. Chucks are made in rotary, rectangular and revolving types in a wide range of sizes.

Air Cylinders Without Tierods Simplify Installation

Contributing to the improved design of the Gerotor double-acting non-rotating air cylinders, a product of the Gerotor May Corp., Logansport, Ind., is the absence of tierods. The keeper-ring design, instead, assures leak-proof construction and permits the end covers to be rotated to any position for convenient location of pipe connections. The keeper-ring construction also permits more compact design of the cylinder and allows it to be applied in a minimum of space.

Gerotor cylinders can be used for 150 lb. air and 300 lb. oil or water

Good GAGES WILL ALWAYS SAVE YOU MONEY!

GAGE COSTS REDUCED *More Than Five Times*

WITH LINCOLN PARK CARBOLOY GAGES

One of the country's largest screw machine products manufacturers recently made exhaustive tests on thread plug gages of various materials used for volume inspection of heat-treated nuts. Lincoln Park Carboloy gages proved to be by far the most economical and are now being used 100% for this inspection operation.

From the report received from this company, the following is quoted: "We find the average stock of steel thread plug gages gives us 5000 pieces before it is necessary to discard the gage. The same gage made from Carboloy would safely give us 250,000 and probably more. From a standpoint of cost, this would give us a gage cost 19c per hundred pieces on a steel gage against 3.6c per hundred pieces on Carboloy."

ONE factor must always be taken into consideration in figuring gage costs. The rejection of parts due to inaccurate inspection can result in losses that cannot possibly be compensated for by the purchase of cheap gages or other inspection equipment.

Lincoln Park gages—whether made of steel, chrome plate or carboloy—are manufactured to precision limits which can only be obtained by the best gagemakers using the finest and most modern equipment available. Particularly in wear-resistant materials, Lincoln Park produces gages which can be specified extremely close to required limits. Because, in these gages, wear allowance can be reduced to a minimum, production departments automatically get the benefit of full manufacturing tolerances. That means the elimination of rejects due to the use of new "over-size" gages . . . and a marked increase on the profit side of the ledger.

In these days of close tolerance production, there can be no compromise in inspection methods. If a part is to be gaged at all, it has been definitely proved that it is poor economy to use any but the best gages. There are no gages produced to higher standards than those you get from Lincoln Park.

LINCOLN PARK MANUFACTURES

Steel and Chrome Plated Plug and Ring Gages and Setting Disks • Chrome Plated Thread Plug Gages • Carboloy Plug, Ring, Thread Plug and Sizing Gages • Carblox (Carboloy Gage Blocks) • Carboloy Anvils • Carburs (Carboloy Rotary Files) • Special Gages and Gaging Equipment and Non-Cutting Precision Tools • Salvaging by Chrome Plating of Gages and Non-Cutting Precision Tools.

ARMY (E) NAVY

LINCOLN PARK INDUSTRIES, INC.

Successor to The Lincoln Park Tool and Gage Company and Carbur, Inc.

1721 FERRIS AVENUE • LINCOLN PARK 25, MICHIGAN

service. Those used for oil hydraulic service can be had with auto-type piston ring construction. Self-adjusting composition packings are used for cups and piston rod, and have been selected for the three services to provide long life and minimum friction.

Other Gerotor air cylinder features include large pipe connections, ample bronze rod guide, over-size alloy piston rod, heavy-duty piston assembly and heavy-duty alloy covers. Gerotor double-acting, non-rotating air cylinders are offered in seven standard mountings, in twelve diameter bores, in any length of stroke.

Compressor Head Utilizes Ford Blocks to Make Unit

A Mogul compressor head that is made of non-critical materials and is designed to use on a Model A or B Ford motor block is manufactured by The Metallizing Company of America, 1330 Congress St., Chicago 7, Ill.

The head is designed to deliver a volume of 139 cu. ft. per min. with an actual delivery of 100 cu. ft. per min. at 100 lb. pressure. The complete unit includes valve and water chambers, air intake manifold, air strainer, unloader, pilot valve and necessary parts for assembly.

Mogul compressor head

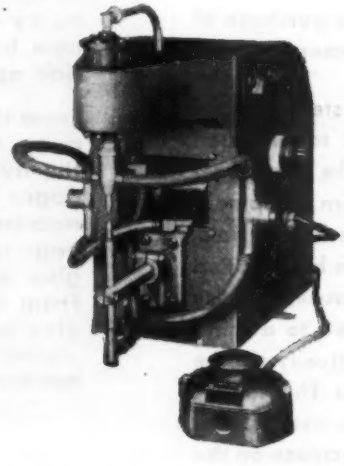
Double-Coil Lockwashers Made to Resist Heavy Loads

Developed by George K. Garrett Company, 1421 Chestnut St., Philadelphia, Pa., the double-coil spring lockwashers have a greater reactive spring pressure than a fine lockwasher, plus more resistance to shock, vibration and severe service. In addition to general usage, they

Garrett double-coil lockwasher

are recommended by the manufacturer for grading, bulldozing, agricultural equipment and other types of heavy machinery.

The double-coil washers can be furnished in sizes for No. 4 screws up to 1 in. and larger bolts, in any desired finish.



Midget automatic spot welder

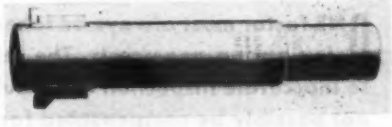
Spot Welders for Light Metals Have Interchangeable Controls

Two models of "Midget" bench type automatic spot welders intended for precision welding of light metals are manufactured by the Interstate Machinery Co., 1451 W. Pershing Rd., Chicago 9, Ill. One unit has a rating of 1 kva and the other 3 kva. The accessories include a built-in automatic timer; a timer panel for intermittent or stitch welding, an automatic pulsation repeat timer, a synchronous single-cycle timer. The welders are equipped with water-jacketed tips, electrodes and transformer. The air-operated mechanism is controlled by a foot switch, pressure switch and solenoid valve.

Block-Type Boring Tool is Quickly Detached from Bar

A quick-detachable cutter block recently developed by The Gairing Tool Company, Detroit 32, Mich., provides self-centering, positive locking, quick insertion of the block in the boring bar and easy removal, without the aid of locating holes or screws, keys, wedges or taper pins.

The block, containing the fully adjustable blades, is made to engage both sides of the precision ground flats on the bar to center itself. When located, the cutting thrust pressure is evenly distributed against the back and bottom of the slot. This tool combines quick change, positive drive and accuracy. The block is slipped through the slot in the bar until the projecting lugs engage the ground flats on the bar. It is then centered. Snap-in spring clips hold the block in place and seal the unit from dirt, chips and foreign matter.



Gairing block-type boring tool

Blocks are fitted with high-speed steel, cast-alloy or tungsten-carbide tipped blades.

Precision-Ground Toolbits Require No Special Grinding

A complete line of "Gold-Tip" precision-ground toolbits is now ready for shipment by the Tru-Cut Tool Company, 14236 Birwood St., Detroit, Mich. These toolbits are designed especially for heavy cutting on scaled materials, such as forgings and castings, as well as for hogging and rough cuts. Also it is said that the toolbits will not chip or break when used on intermittent-cutting operations, because their hardness lies between 62 to 64 Rockwell C. Included in the standard line are squares ranging from 3/16 × 3/16 × 2½ in. to 1¼ × 1¼ × 7 in. Flats range from ½ × ⅝ × 5 to 1¼ × 1½ × 8 in. Cut-off blades are available in sizes from 3/32 × ½ × 4½ in. to ⅜ × 1 × 6 in. Further information on this line of Gold-Tip tools is contained in a catalog from the Detroit manufacturer, which also makes center drills, lathe mandrels and form tools.

Nothing Rolls Like a Ball . . .

. . . but Mrs. J. Woofington Smith-Smythe wishes she hadn't had to demonstrate it in just that way. Especially since that fundamental fact *is* being demonstrated in *thousands* of ways in every phase of war and industry.

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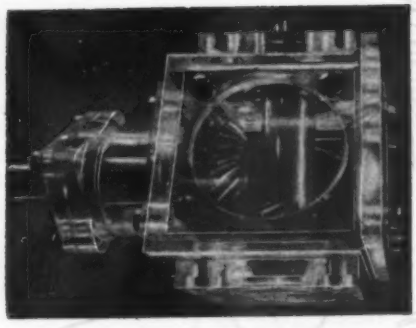

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A standardized system of remotely operated mechanical controls is manufactured by M. L. Bayard and Co., 1913 Indiana Ave., Philadelphia 32, Pa. The related units are suitable for power operation at speeds not exceeding 1800 r.p.m. Terminal connections are so constructed that rearrangement of units can be made without disturbing the assemblies or affecting their internal adjustment. The assembly units are furnished in two standard types. One is designed to attach to a surface which is square to the shaft, the other attaches to a surface parallel to the shaft. All shaft ends of the units are interchangeable and either three shafts or two shafts can be connected to other control units. The universal shaft assembly is made in lengths ready to be installed, or with one end-yoke to be field welded. A telescoping splined portion between the end yokes permits installation and removal without disturbing other control units.

TRADE PUBLICATIONS

Broaching—Four-page bulletin VAS-45 describes line of single-ram machines for surface broaching. Colonial Broach Co., P. O. Box 37, Harper Station, Detroit 13, Mich.

Chain—Form C145 tabulates dimensions and mechanical properties for various types of single- and multiple-sling corrosion-resistant chains. Youngstown Welding & Engineering Co., Youngstown 9, Ohio.

Centering Head—Leaflet describes tool similar to a center gage; useful for laying out and leveling. Eastern Research & Engineering Co., 37-39 Pearl St., Boston 10, Mass.

Conveyor Chain—Bulletin No. 461 pictures and describes a new flat-top conveyor chain. Chain Belt Co., Milwaukee 4, Wis.

De-Burring Machines—Bulletin describes equipment for mechanical finishing a variety of metal parts; tabulated data of space requirements and shipping weights. The Sturgis Products Co., 400 Jacobs St., Sturgis, Mich.

Diesel Engines—Booklet "The Story of the Diesel" tells of postwar future, applications and advantages. Diesel Engine Manufacturers Association, 1 N. LaSalle St., Chicago 2, Ill.

Disk Grinder—Leaflet describes several types of hydraulically operated disk grinders. The Kindt-Collins Co., 12651 Elmwood Ave., Cleveland 7, Ohio.

Drills—Leaflet gives metric and decimal sizes of precision (twist) drills from 0.15 mm. to 1.00 mm. and watchmakers' (flat) drills from 0.15 mm. to 1.00, both kinds in high-speed steel. Whitman & Barnes, 2108 W. Fort St., Detroit 16, Mich.

Forgings—Eight-page bulletin about precision forgings in any size, metal or alloy. Titusville Forge Div., Struthers Wells Corp., Titusville, Pa.

Grinding—"101 Grinding Questions Answered," a portfolio about grinding problems. Simonds Worden White Co., Dayton Grinding Wheel Division, 831 Negley Place, Dayton 7, Ohio.

Hardenability Calculator — Circular slide rule for computing hardness of steel from its chemical composition and grain size. Steel & Tube Div., Timken Roller Bearing Co., Canton 6, Ohio.

Heat-Treating—Folder SC-124, "Dry cyaniding in SC Furnaces" in a gaseous atmosphere containing carburizing gases and ammonia. Surface Combustion Corp., Toledo 1, Ohio.

Industrial Trucks — ATC Bulletin 1001 illustrates several types of "Transporter" trucks gives capacities and dimensions. Automatic Transportation Co., 101 W. 87th St., Chicago 20, Ill.

Instruments—One booklet describes the aircraft jig collimator, the other describes types of precision erecting transits and levels. C. L. Berger & Sons, Inc., 37 Williams St., Boston 19, Mass.

Machine Centers—Bulletin No. 137 describes stock sizes of Carboloy-tipped centers for Morse, Brown & Sharpe and Jarno tapers. Tungsten Carbide Tool Co., 2661 Joy Road, Detroit 6, Mich.

Metal Cleaning—Bulletin describes chemical cleaning of metal surfaces before silver brazing. Kelite Products, Inc., Los Angeles 1, Calif.

Oil-Less Bearings—Size list No. 20 gives tabulated data of sleeve bearings, thrust washers and bar stock made of Compo porous bronze and Powdiron sintered iron. Bound Brook Oil-Less Bearing Co., Bound Brook, N. J.

Oil-Less Bearings — Leaflet gives data about D-10, a combination of brass and fine graphite processed by powder metallurgy. Keystone Carbon Co., Saint Marys, Pa.

Tap Lubrication — Leaflet No. 5 gives a table of recommended lubricants for many types of ferrous and non-ferrous metals. Greenfield Tap & Die Corp., Greenfield, Mass.

Thread Grinding—Bulletin M-100-145 shows methods of multiform precision grinding to profiles by crush dressing with economy of dressing and grinding time and materials. The Sheffield Corp., Dayton 1, Ohio.

Tubing—Form T145 has data about size of corrosion-resistant tubes and welding elbows. Youngstown Welding & Engineering Co., Youngstown 9, Ohio.

Universal Joints—Leaflet gives dimensions, weights, and breaking loads; another has full-size drawings of all sizes made. Curtiss Universal Joint Co., Inc., Springfield, Mass.

Vibration Control—Two books: one describes general applications of laminated rubber to control impact, vibration and noise, with a date section, the other shows actual railroad applications for dampening vibration and minimizing noise. Fabreeka Products Co., Inc., 222 Summer St., Boston 10, Mass.

Welding—Four-page folder tells about low-temperature welding alloys. Eutectic Welding Alloys Co., 40 Worth St., New York 13, N. Y.

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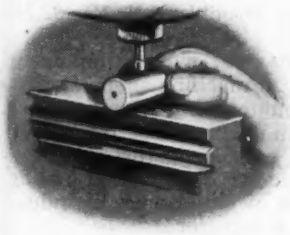
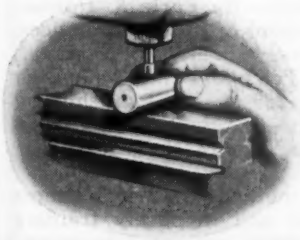
I KNOW WHERE I AM!"



"LAST WEEK

I was grinding to a tolerance of .002". It was a cinch with a gage like this!"



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NEW BOOKS

DICTIONARY OF ENGINEERING AND MACHINE SHOP TERMS—*By A. H. Sandy, instructor and lecturer, Mechanical Engineering Department, Borough Polytechnic, London. First American edition revised by I. E. Berck, Ph.D. 153 pages. Published by the Chemical Publishing Co., 234 King Street, Brooklyn, N. Y. $2.75.*

Definitions of many important terms used in machine shops, industries and engineering literature are presented in clear concise form. The author has condensed the meanings of terms and words gathered during many years of experience in industry and as a lecturer.

This dictionary, presented in alphabetical form, is considered useful for engineers and students of engineering as well as foremen and specialized workmen of various shops and industries.

•

CONFERENCE LEADERSHIP IN BUSINESS AND INDUSTRY—*By Earle S. Hannaford, supervisor of training practices, Long Lines Plant Department, American Telephone and Telegraph Company. 289 pages. Published by the McGraw-Hill Book Co., 330 West 42 St., New York 18, N. Y. $3.*

Specific methods used in business conferences and in purely training conferences are presented in narrative form. Certain items are covered on a straight informational basis followed by discussion, while others are handled on a developmental conference basis.

The author cautions conference leaders to absorb the material thoroughly, to complete proper planning for their conference, and then to avoid too conscious an effort to follow and check on each step and detail of the procedure as they attempt to use it. He points out that unless the processes recommended are carried out in a natural, uninhibited manner, artificiality will be evident and thus defeat the purpose of planned conference procedure.

Because of the numerous conferences confronting industrial leaders as they approach the period of returning to peacetime operations after war production years, preparation of conference material and subjects will be an important consideration. One section of the book is devoted to questions and their use in conference leading. It is generally conceded that question periods can easily get out of hand unless certain precautions are taken by conference leaders.

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conference leaders. A chapter is devoted to this particular subject and deals with adjustment of leadership training to the needs of various supervisory levels and the training of key conference leaders. The final chapter offers some "Do's and Dont's" for conference leaders.

SEEN and HEARD

By JOHN R. GODFREY

Round Holes and Square Pegs

THERE ARE more problems ahead for postwar days than merely getting jobs for the men who come back. While jobs are the first problem, the *kind* of job is also important, not only to the man, but to industry and to the country. It may be that in some cases the old job will be O.K. But in many others it will not be enough. Few of the men who have seen long service will be content with routine jobs that were satisfactory before. They have seen action and lived dangerously and may not fit into the old routine at all.

On the other hand many of them will come back with new skills that will not only make them discontented with their old jobs, but result in a waste of manpower in the community if they went back to them. One of our jobs is to take time to find out what they can do and want to do.

Faster Airliners Predicted

POSTWAR AIRLINERS plying between London and Boston on eight-hour schedules are foreseen through development of gas turbine engines. Hot-air turbines that will rotate 200 times a second and drive a hundred tons of air an hour through a jet nozzle at a steady, thousand-mile-an-hour pace are predicted by Fred K. Fischer, an engineer of the Westinghouse Electric & Manufacturing Company.

Cost Considerations

THE COST REDUCING possibilities of replacing hand labor with machinery has one of its best examples in the removal of burrs raised in machining operations. This is particularly true on parts of airplane engines and similar products which have to be polished all over. Here the cost of removing burrs mounts to a surprising figure. Often it exceeds the cost of machining the piece from the forging until it reaches the bench for removing burrs. In some shops this cost is remarkably high as it takes a lot of time to remove all the burrs thrown up by cutters of various kinds.

Both the use of tumbling barrels and of automatic polishing machines have greatly increased, as the cost of burring began to make itself evident. Proper use of tumbling does a remarkable job on many machined parts. But there seems to be no royal road to success in tumbling as each piece may present a different problem, because of its size and shape. Form of the tumbler, the material used, the amount of liquid and the speed of rotation, all play a part.

Standardized Routine For Use of Shop Drawings

BY M. MAXWELL

A JOBBING SHOP is designing tools which require large construction drawings, some of them being 34x66 in. The customer complained of the unsightly condition of some of the drawings. Most of them, especially the large ones, were mussed from excessive handling.

To eliminate the turned up edges, a 1 in. border is allowed on the edges of the drawing to be trimmed after all corrections are made and passed by the checker. By limiting the size of detail sheets when possible to 22x34 in. small drawings are not mussed as easily as large ones. A white print of the construction drawing is made for the detailer. This saves wear and tear, and also checks the quality of the construction drawing. If the detailer can read the print the toolmaker can also read it. When the detailed drawing is completed, a print is made. The checker then uses the prints of the construction drawing and the details, marking up the prints in any manner he believes best, which he cannot do when checking the actual tool drawings. These marked prints serve as the foreman's record of the detailer's ability and also protects the detailer in the event of an incorrect change by a checker. The detailer then makes the drawing conform to the marked prints and the checker then compares the result.

This method is especially efficient when more than one detailer is used. Each detailer is given his own print which avoids the confusion and delay caused by two or more detailers congregating around one construction drawing.

Training New Employees

TRAINING inexperienced workers is always a problem, aggravated at present by the need for large numbers for work of many different kinds. Methods vary as widely as the work for which they are needed, with results that leave little clue as to which is best.

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and more efficient cutting
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THE CAPEWELL MANUFACTURING COMPANY HARTFORD, CONNECTICUT, U. S. A.
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Capewell Handbook
No Obligation — this helpful booklet is given to all hack saw users free of charge.
Learn new ideas for boosting the efficiency of your hack saw blades, by turning to pages 8 to 13. This section covers both power and hand hack saw blades. It contains a chart giving the weight of feeds and speeds, together with blade tooth specifications, for each type of material commonly sawed by power blades.
For information helping you obtain greater blade life and greater efficiency from band saw blades, turn to pages 14, 16, 17 and 21. This information covers flexible metal cutting band saw blades and contour saw blades.
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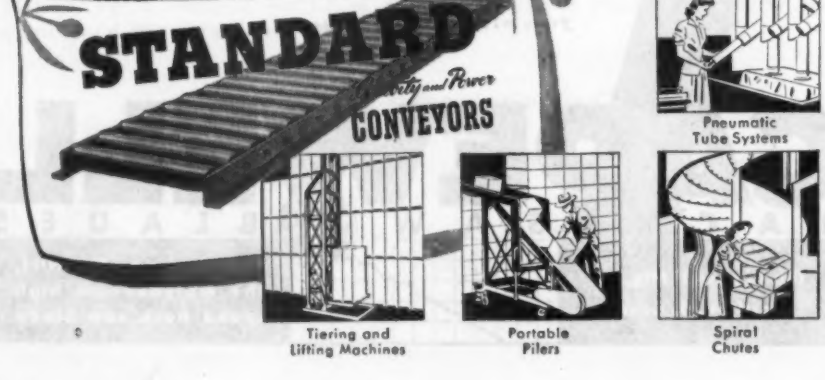


The first World War developed several quick-training methods under various names, "vestibule schools" being a general term that was applied to most of them. They were vestibules, or kindergartens, between the personnel office and the shop. These attempted to short-cut, or telescope, the training plans used by well-known shops where apprentices served from three to four years to learn a trade. From three to six weeks were usually considered sufficient time for teaching men or women to handle drilling, or turret lathe work and fit them for the production line. This time has been still further reduced in many cases in the present emergency.

One well-known instrument maker, whose work is of a high precision quality, has abandoned any sort of a training school and puts the new man or woman on the production machine itself, with an instructor. Sometimes the instructor may be a foreman, or a leadman and in other cases a woman who was a learner only a few weeks before.

Taking a small part on a lathe, or a drilling machine, the instructor sets up the machine and does a few pieces—or may have the beginner just watch an experienced operator do the job. Then the new operator tries a few pieces under the watchful eye of the instructor. On simple operations, and most of them are simple by themselves, it takes only a short time before the beginner can do the job slowly, but fairly well.

Most women learn to measure or gage work very quickly with gages or micrometers. They are said to be particularly keen in detecting the dulling of a tool by the appearance of the finished surface. When the appearance changes even slightly, they call the leadman who puts in a sharp tool and the work goes on.

Flexible Inspection Methods Can Eliminate Slow-Downs

BY FRANK C. HUDSON

ANY DEVIATION from standard inspection practice that will save delay, without being detrimental to the product, should be permitted as necessity may require, particularly in the matter of urgently needed wartime machines and materials. Inspection in itself is a peculiar part of manufacturing. It can help production or block it, according to the methods used by the individuals who do the work.

In the old shops where men built entire machines and no two were ever exactly alike, the second piece was made to fit the first. When the work was split up, however, and replacement parts were supplied, the plan didn't work so well and

brought about inspection of pieces as they were made. That was when the talk about "interchangeability" began.

In some of the old shops, where the work was divided up into many operations, each man was made the inspector of the previous operation. If work came to him that was not right he was supposed to refuse it. If he took a shaft that had the collars wrongly spaced and did his job such as threading the end, he didn't get paid for his work when the assembler found he couldn't use the shaft. This made every man a watchdog on the fellow who came before him. It sounded like a cheap way of getting inspection done, but the practice didn't prove good enough to last.

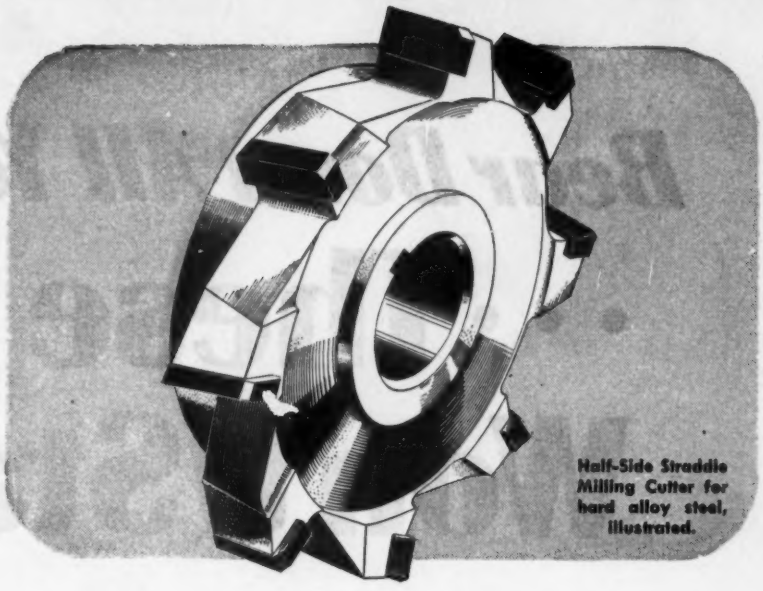
Then came the elaborate inspection room, or "viewing room" as our British friends call it, into which all parts were trucked before going to the stockroom and from which they were fed to the assembly department. Inspection of this kind has largely gone by the board.

The advent of "go" and "not go" gages gave birth to the idea that when the inspectors' gages wore a little they were good enough for the shop. This caused plenty of trouble. An inspector would reject work that was correct by the shop men's gages. So the process was reversed and the inspectors' gages now have the greatest tolerances—all that can be safely allowed and have the parts work as they should.

But that isn't the whole answer either. In shops with many inspectors it is customary to have the rejects re-inspected by men who can exercise good judgment as well as handle gages. These top inspectors are supposed to know enough about the product and its uses to stretch tolerances in certain dimensions, when they know it will not affect the satisfactory performance of the complete machine. This super-inspection is sometimes called the salvage inspection.

Under various names we have developed the necessary inspection of units before they join the final assembly lines. These units must be tested or inspected from two distinct angles. First to know that they do their stuff, and second that they fit the place into which they are supposed to go. Unless they do, the final assembly line gets into difficulties, production schedules are upset, shop space becomes over-crowded and products do not come off the line as rapidly as they would if the condition was corrected.

Inspection has but one legitimate function to pass as many pieces as possible that will work satisfactorily in the finished machine. Any inspection system that accomplishes this is a success. Any system that fails to do this, no matter how scientific or foolproof, should go into the discard.



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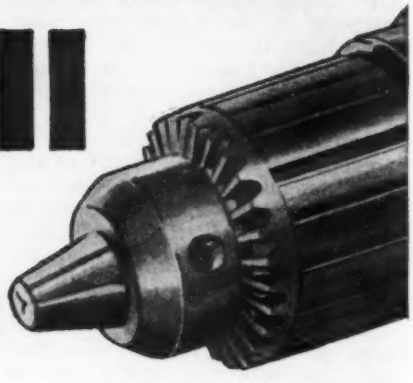

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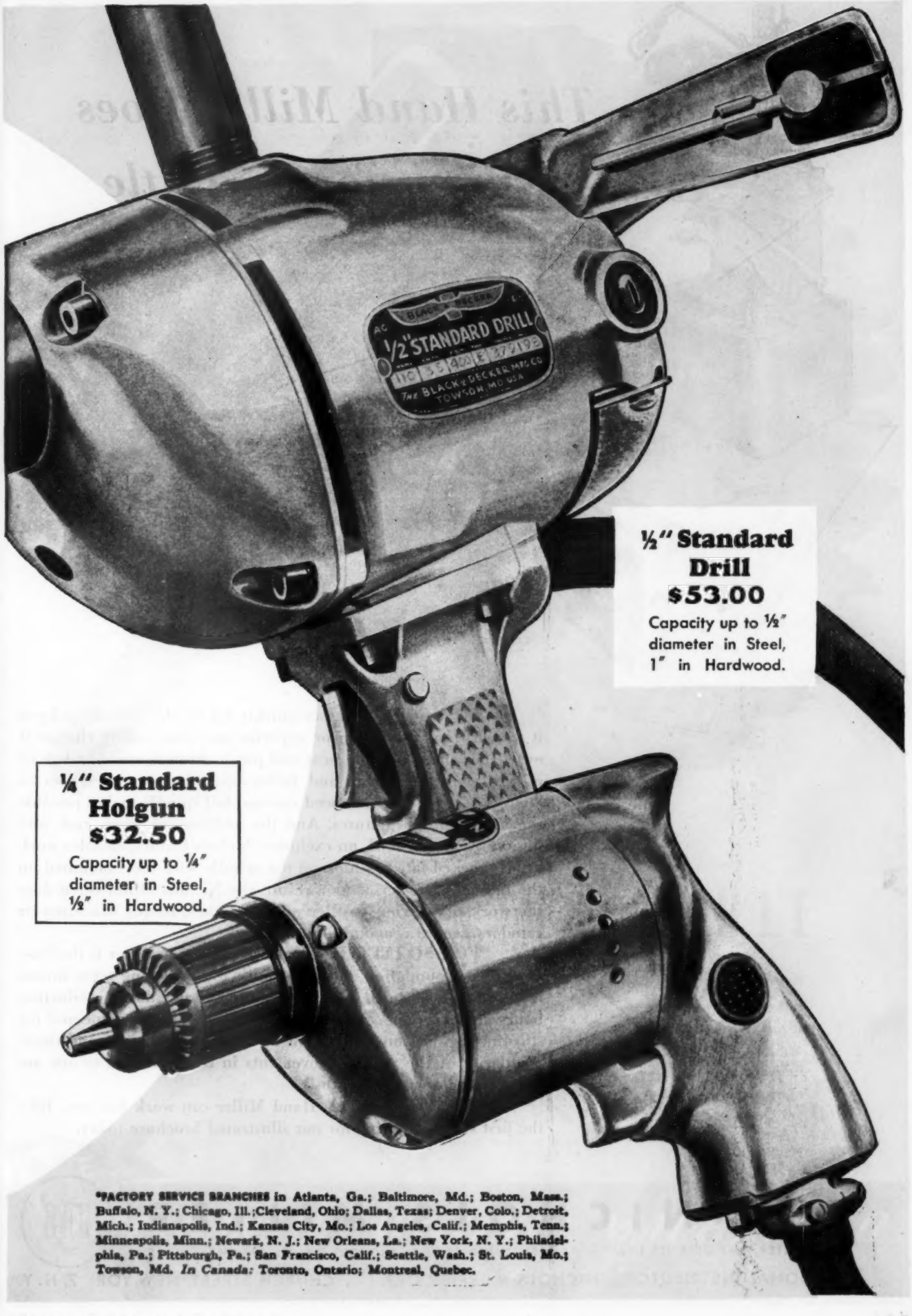

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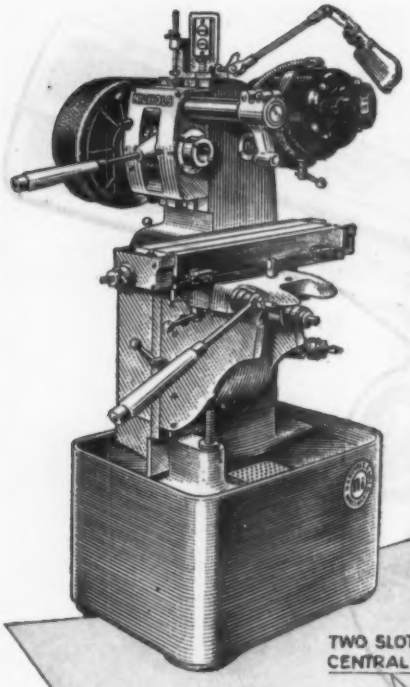
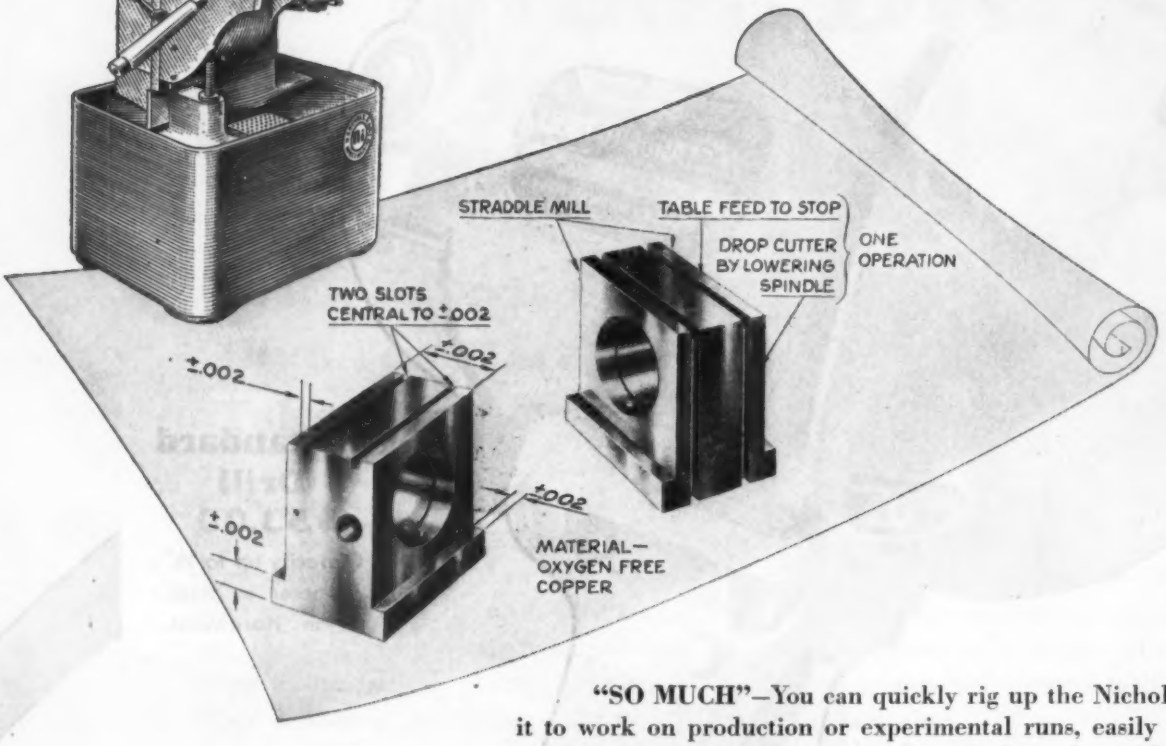


This Hand Miller Does So Much for So Little



"SO MUCH"—You can quickly rig up the Nichols and put it to work on production or experimental runs, easily change it over from one job to the next and put it through a wide range of milling, boring, turning and facing operations to tolerances in "tenths." The counterbalanced rise-and-fall spindle makes possible the use of simple fixtures. And the addition of lever, rack and pinion transverse feed, an exclusive Nichols feature, enables work to be chucked lathe fashion on the spindle with tools mounted on the table or vice-versa. As a result, the Nichols Miller often does the work of heavier, costlier millers, lathes, boring machines or grinders...more economically.

"FOR SO LITTLE"—The Nichols Hand Miller is the least expensive "foundation" machine built today, a long term investment that pays its own way from the start in maximum production hours and minimum maintenance. Every detail is engineered for sturdiness, precision and ease of operation. Parallelism and right-angularity of the various movements in their relation to one another are held within "tenths."

See how the Nichols Hand Miller can work for you. Take the first step by writing for our illustrated brochure today.

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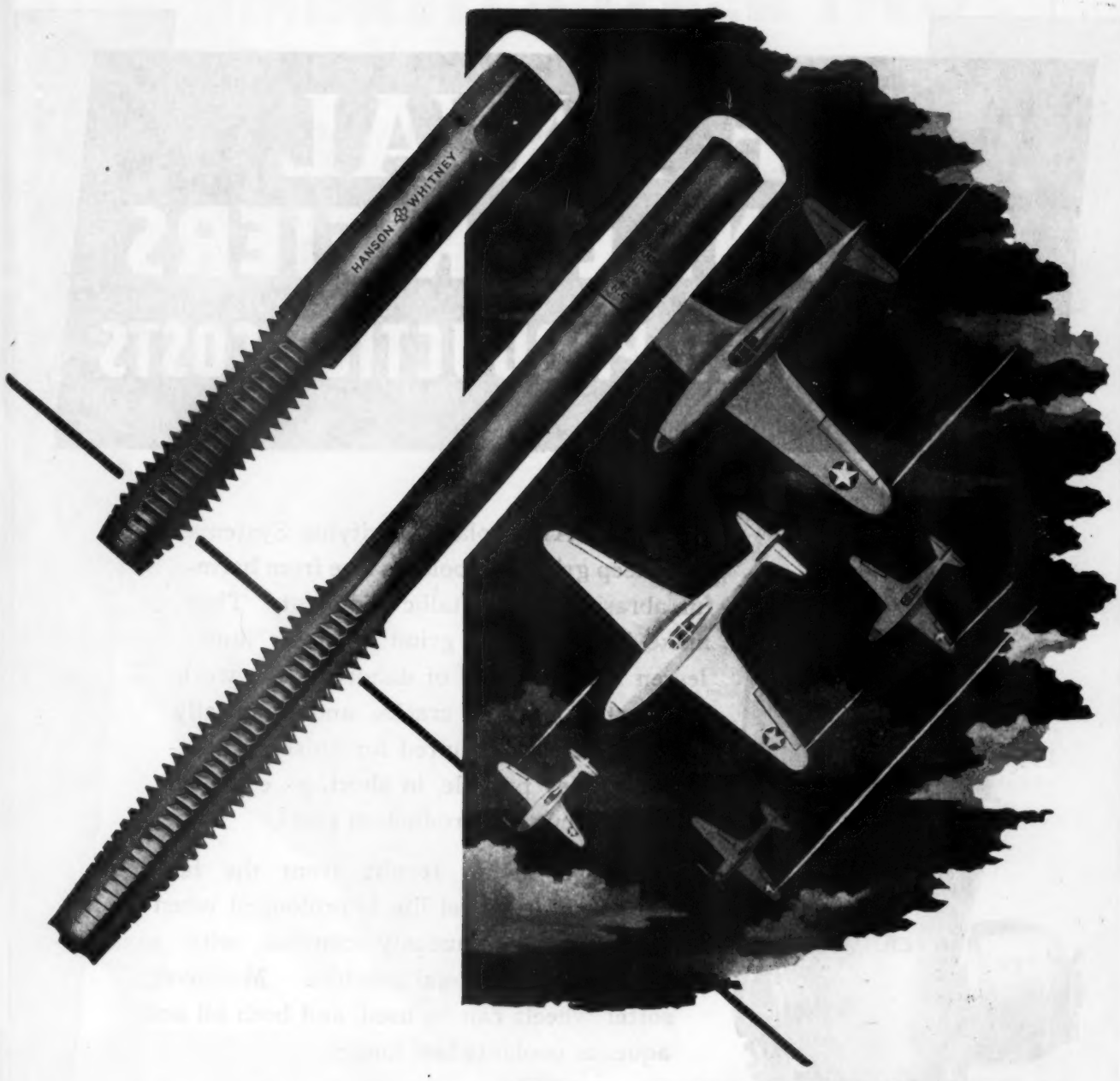

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Pratt & Whitney *powered* Corsairs fly with Pittsburgh Steel..

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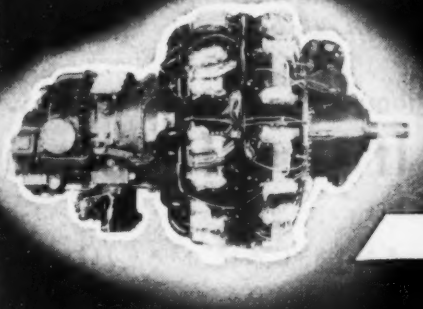
The Chance Vought F4U Corsair fastest carrier based airplane!

Master rod bearings of Pittsburgh steel are faced with silver, and then lead—a P&W original development. Of the two bearings used in each Double Wasp engine (see illustration at left) one is shown partly inserted in the master rod.



The Pratt & Whitney R-2800, 2000 H. P. Double Wasp engine powers such famous warplanes as the F4U Corsair, C-46 Commando, A-26 Invader, F6F Hellcat, P-47 Thunderbolt, PV-1 Ventura, P-62 Black Widow, B-26 Marauder, C-82 Packet

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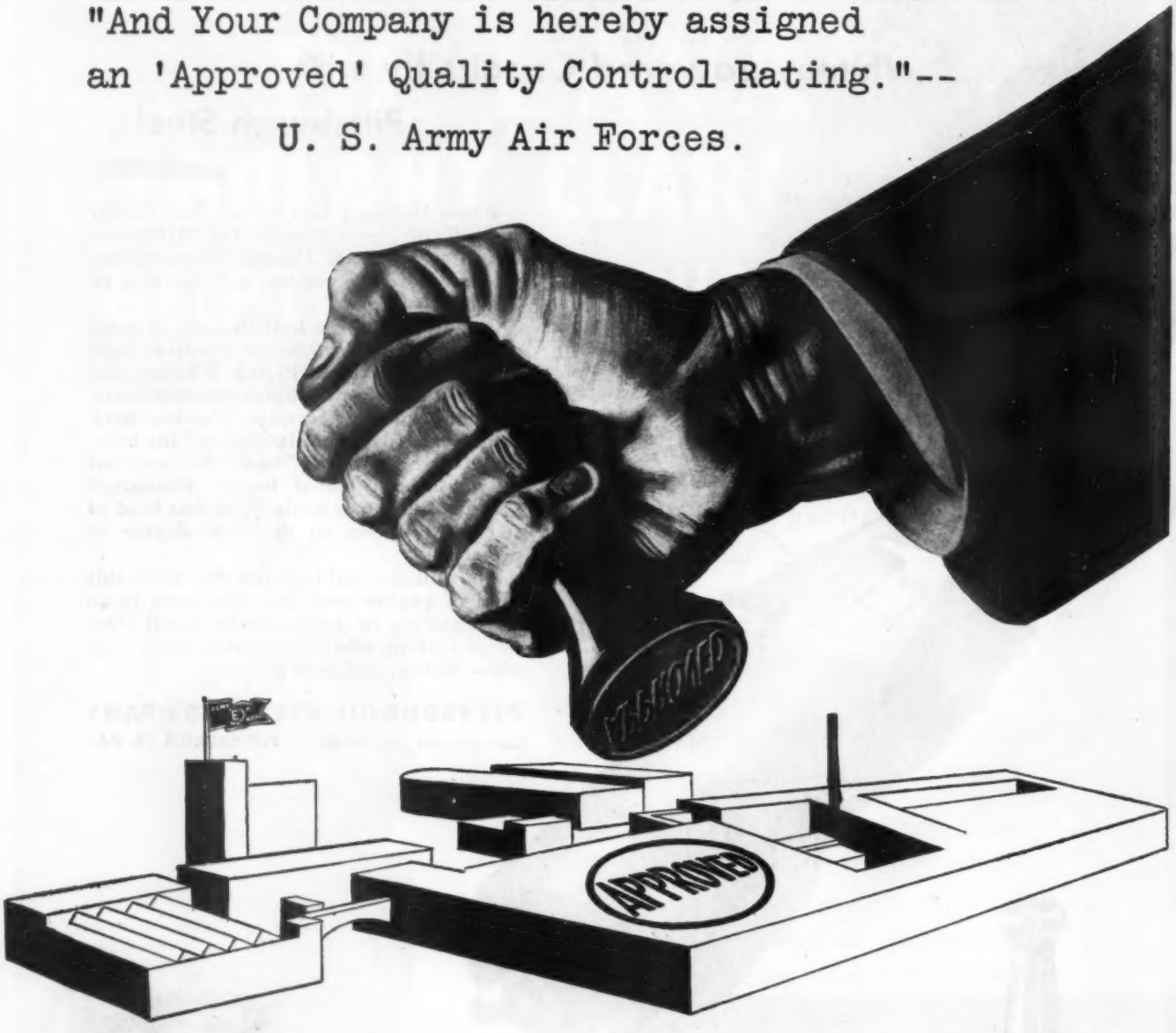

"The Quality Control as established by your company has demonstrated that your Inspection Organization can be entrusted with full responsibility that your products pass all requirements as established by the Army Air Forces, and your company is assigned an 'Approved' Quality Control Rating. Duplication of Inspection during detail fabrication by Air Forces personnel will be eliminated".

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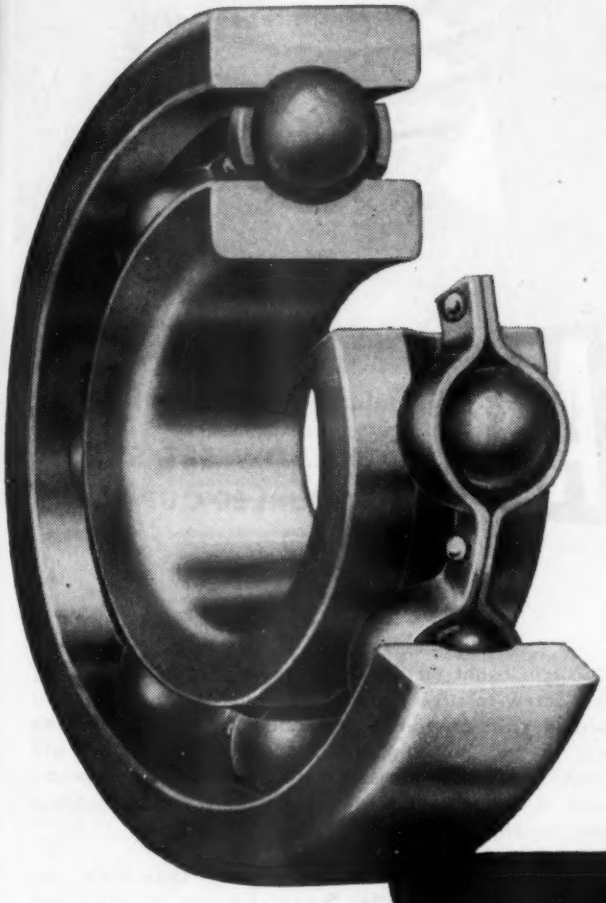
CONSTRUCTION? *Sturdy!*

APPLICATION? *Wide!*



SOUND design engineering calls for *careful* consideration of bearings *before* final blueprints are drawn. Where a dependable and sturdy radial bearing is required, the BCA single row Conrad (illustrated) will repay careful study.

BCA radial bearings are made in a variety of types for a wide range of applications—both in new equipment and as replacements. These bearings include single row Conrad; single row Conrad with metal shield; single row Conrad with felt shield; single row Conrad with snap ring groove and single and double row maximum types. Careful engineering and sound construction fit each bearing to the condition of load and shock for which it is designed.

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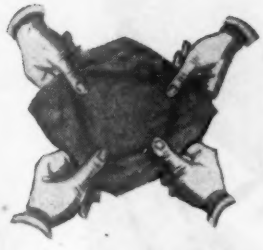

INTO THE MOLD goes a charge of die-cut cloth. Several minutes later, out comes a fully formed aircraft antenna mast, clean of line and sleek of finish. The seeming miracle takes place because this is no ordinary cloth. It's a fabric impregnated with BAKELITE phenolic resin. It is called Resin X-Crepe molding material, made by Cincinnati Industries, Inc.

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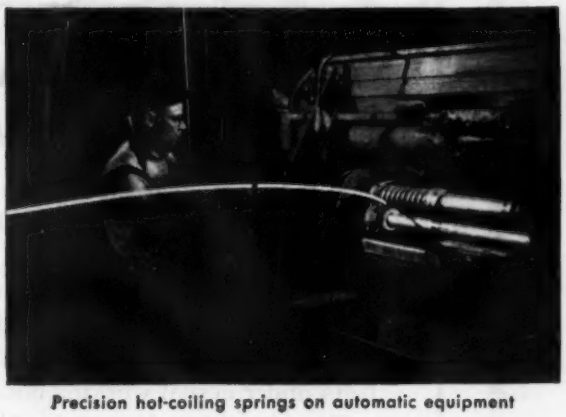

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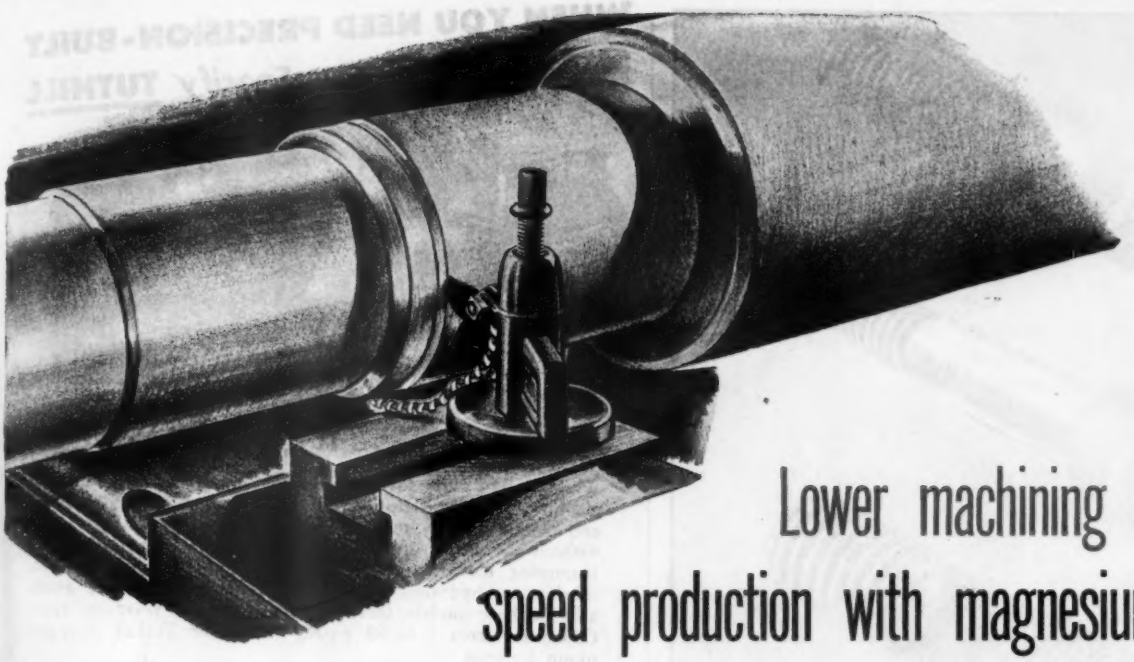

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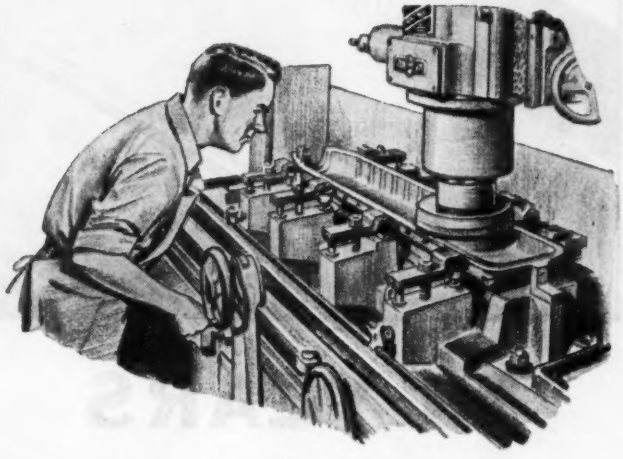

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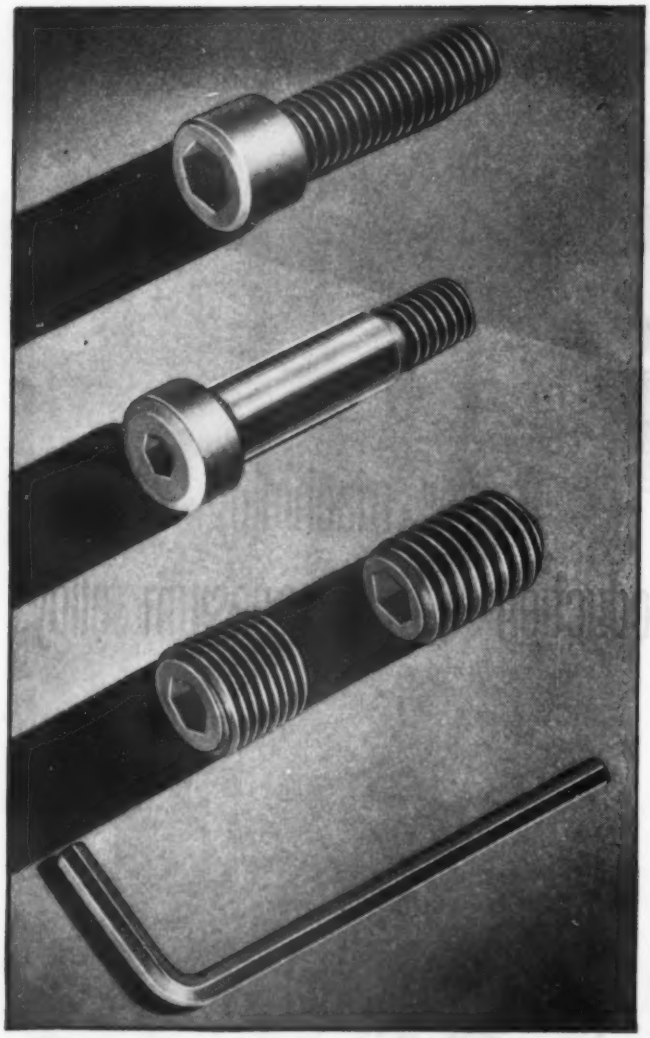

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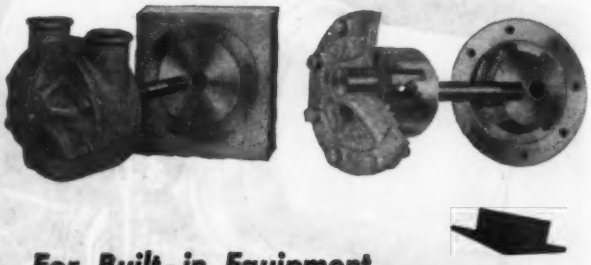

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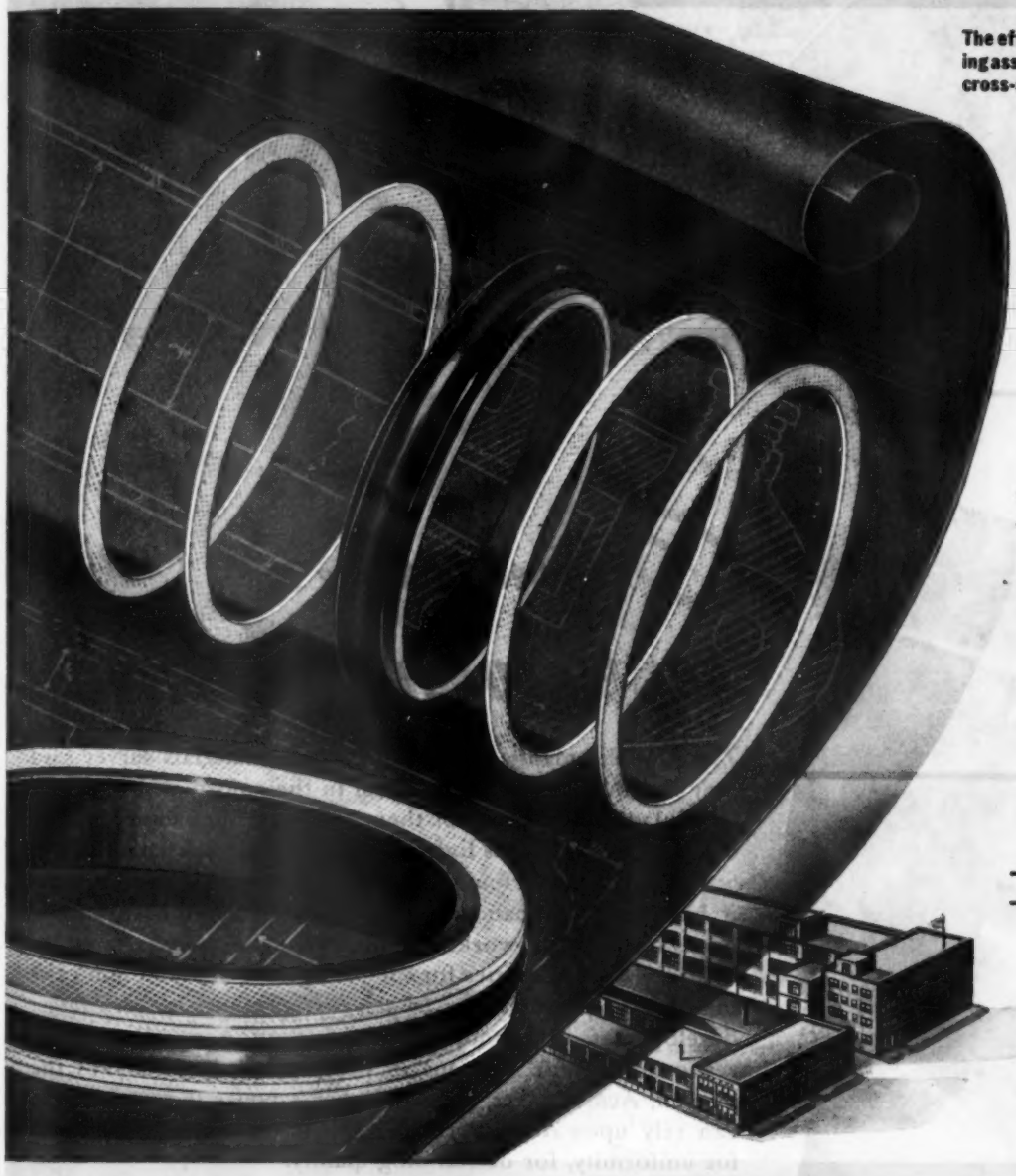
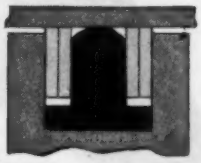
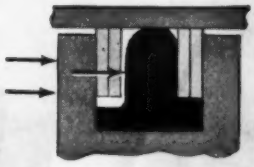


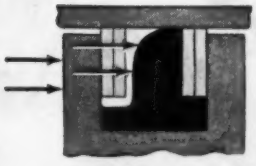
The efficiency of the T-ring Packing assembly is shown by the three cross-sectional panels below.



1 Packing before pressure is applied. Note clearance between the flanges and the guard rings.



2 Packing upon immediate application of pressure which swells the flange under the farther guard ring and against cylinder wall.



3 Full application of pressure. Guard rings are held tightly against cylinder wall — no binding or jamming.

Look Ahead with WF

Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND 8, OHIO
Plants: Cleveland, Columbia City, Ind., Warsaw, Ind., Los Angeles
Canada—St. Thomas, Ontario

The problem of properly sealing fluids in many types of machines is an important one. The new, improved Weatherhead T-ring Packing, recently patented, meets the requirements for both standard and special applications. This seal is available in two types and in sizes varying from ½ inch to 4 inch O. D. For information or literature write or phone any Weatherhead branch office.

BRANCH OFFICES: NEW YORK • PHILADELPHIA • DETROIT • CHICAGO • ST. LOUIS • LOS ANGELES

Equipped to Serve the 76% with ACME ALUMINUM CASTINGS!

76% of the plants answering a recent materials survey said they use aluminum in some form in their normal products—and a large percentage of them indicated they expect to increase their use of this light weight, corrosion resistant metal.

Since Acme was founded over a quarter of a century ago, it has steadily expanded its service to meet the advancing needs of the metal-working industry.

Today Acme facilities for the production of aluminum castings by the *permanent mold process* represent the very latest developments in technique and equipment. Acme assumes the responsibility for all steps in production. Acme makes the pattern; Acme makes the mold; Acme pours the metal. You can rely upon Acme Permanent Mold Castings for accuracy, for uniformity, for outstanding quality.

The advantages offered by Acme Permanent Mold Aluminum Castings may help you to lower costs; to improve production. Our engineers will be glad to submit recommendations.

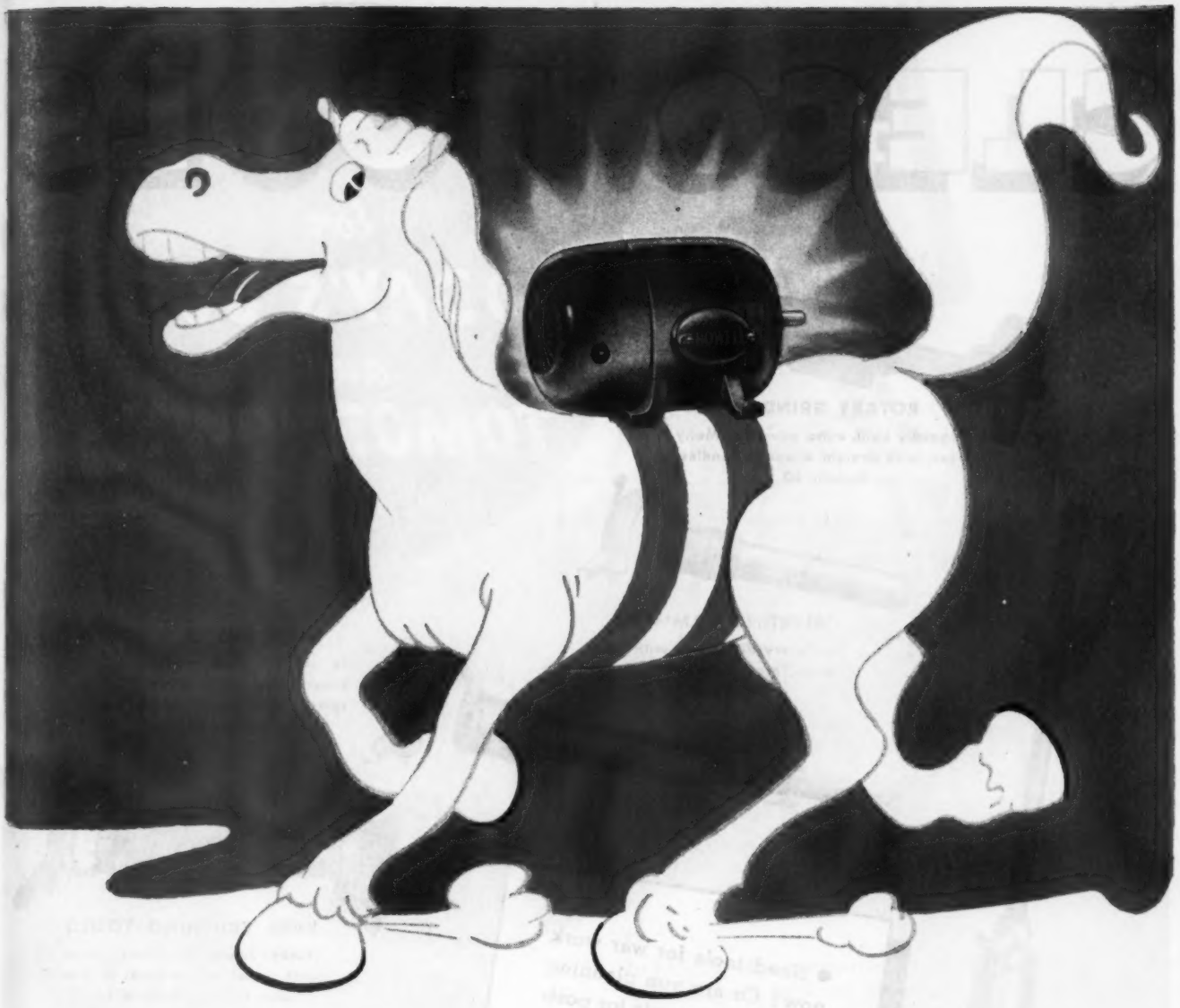
GET THE COMPLETE ACME STORY — Send for 44-page, fully illustrated book, showing how Acme is organized and equipped to supply your castings needs and to render complete service to the metal-working industry.

ACME *Aluminum Alloys, Inc.*

Formerly Acme Pattern & Tool Co., Inc.

DAYTON 3, OHIO

PATTERNS • TOOLS • ALUMINUM CASTINGS • ENGINEERING



It may come to this—

but we won't cut Howell Quality

The Howell Protected Type Motor, shown, gives complete protection against dripping liquids, metal chips and other falling particles. Completely streamlined—utilizing non-breakable steel frame—malleable or steel base—cast iron end plates and cast iron, weatherproof terminal box are standard construction features. Special horizontal and vertical mountings are available.

Available in sizes 5 H.P. and smaller. Other sizes and types available up to 150 H.P.

Yes, it may even come to the point where we have to press the good old Howell Horse into service to make deliveries on our famous motors. That's how serious the delivery situation is in the entire electric motor industry today.

But there's one thing you can count on now, as always—*we'll never, never cut Howell quality.* Every Howell Motor is built of the finest material, statically and dynamically balanced, and thoroughly insulated throughout.

So, until the delivery situation clears up, please bear with us. We recognize our obligations fully. We are putting forth our maximum efforts to build more and more Howell Motors, and to see that they are distributed among users whose needs are most vital to the war effort. This, we know, is as you would have it.

HOWELL ELECTRIC MOTORS COMPANY

HOWELL, MICHIGAN

Manufacturers of Quality Motors Since 1915

CLECO TOOLS

for

TODAY'S JOB *and* TOMORROW'S

ROTARY GRINDERS

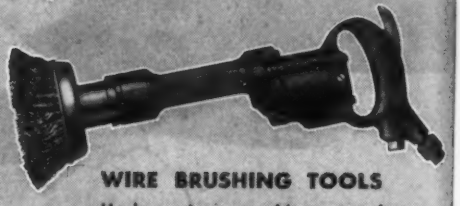
Ruggedly built, extra powerful. Many sizes, with straight or spade handles. Bulletin 80.

RIVETING HAMMERS

For heavy duty work with hot rivets. Three styles of handles. Bulletin 82.

RIVET BUSTER

To cut off rivet heads, break down walls, drive spikes and small drift bolts. Bulletin 82.



WIRE BRUSHING TOOLS

Husky rotary machines, used with radial wire brushes or cup wire brushes. Bulletin 80.

SCALING TOOLS

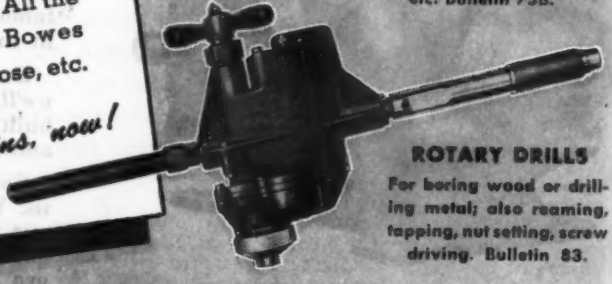
Handy hammers for cleaning paint, weld splash, scale from metal surfaces, etc. Bulletin 75B.

RAMMERS

For back fill tamping of earth excavations, and for ramming in the foundry. Bulletin 76B.

- Need tools for war work now? Or are you planning your requirements for post-war jobs? . . . The complete Cleco line offers the *right* tool for many major operations. Fast workers, that take it easy on air consumption, Cleco Tools are the product of over 50 years experience in this field . . . All the accessories, too — Bowes Couplings, valves, hose, etc.

Write for Bulletins, now!



ROTARY DRILLS

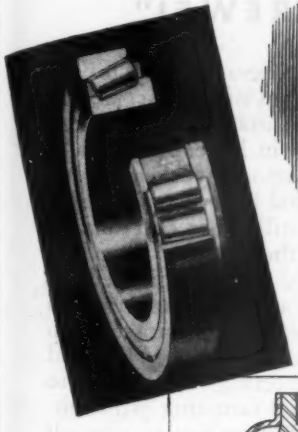
For boring wood or drilling metal; also reaming, tapping, nut setting, screw driving. Bulletin 83.

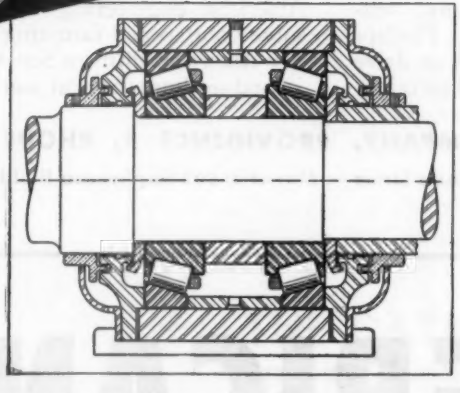
THE CLEVELAND PNEUMATIC TOOL CO.

3781 EAST 77TH STREET • CLEVELAND 5, OHIO

Branch Offices in All Principal Cities

CARRYING PUMPING LOADS OF A DECADE OF DREDGING





Type of single-row, tapered roller bearings made by Torrington, and cross-section view showing bearing as used at Fort Peck Dam in the 28″ Bucyrus-Erie Dredge Pump.

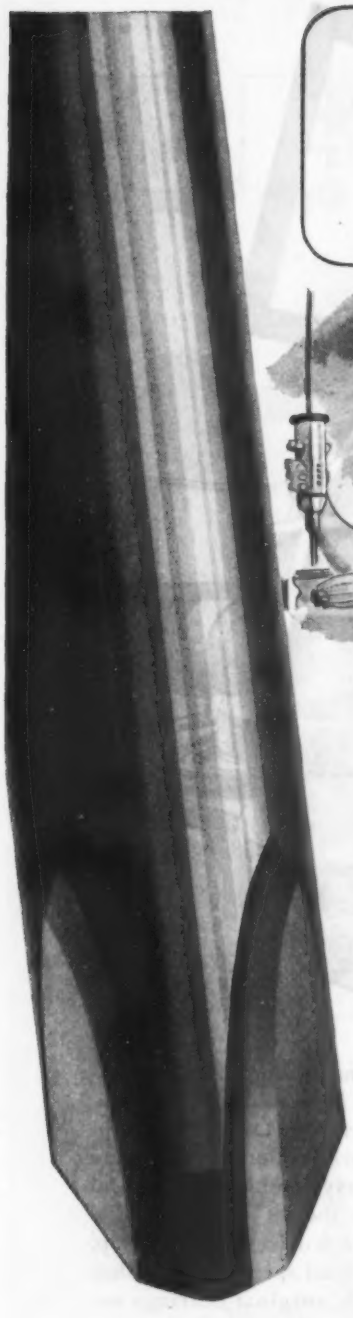
In 1934, dredge pumps manufactured by Bucyrus-Erie Company of South Milwaukee, Wisconsin, were installed at the Fort Peck Dam. Two high-capacity Torrington tapered roller bearings were specified to carry the heavy combined radial and thrust loads imposed by the 28″ diameter (discharge) pumping units, each driven by a 2500 h.p. motor at 253 r.p.m. full load speed. Today, after ten years of hard service, original bearings are still operating efficiently in these pumps.

Design and manufacture of large, custom-built, anti-friction bearings for heavy-duty service on engineering projects and on the machinery of the steel, paper, oil, machine tool and other industries is an important function of Torrington's Bantam Bearings Division. The specialized knowledge and cooperation of Torrington engineers are at your disposal: don't hesitate to call on them for help on any anti-friction problem, routine or unusual.

THE TORRINGTON COMPANY · BANTAM BEARINGS DIVISION
SOUTH BEND 21, INDIANA

TORRINGTON BEARINGS

STRAIGHT ROLLER · TAPERED ROLLER · NEEDLE · BALL



"The Boss is kicking himself all over the shop . . .

. . . for thinking he couldn't afford to use these AMERICAN PHILLIPS SCREWS!"

Yes, it's always a shock (*but a welcome one!*) to see how much has been missed by sticking to slotted screws because of a mistaken idea that American Phillips Screws cost more. In small shops and big plants, cost-comparisons, production sheets and inspectors' reports always tell this same story: *The screws that really COST LEAST to use are American Phillips Screws.*

And that's simply because an American Phillips Screw is not a *loose end* on the driver. It's a firm-fitting, self-aligned *part* of the 4-winged Phillips driver which can't twist out or drive crooked. This means ease and certainty of handling and operation which pays off in time-savings of at least 50% in unscarred work-surfaces and unbroken screw-heads . . . in lower fatigue and higher morale among workers . . . in higher output and lower fixed costs.

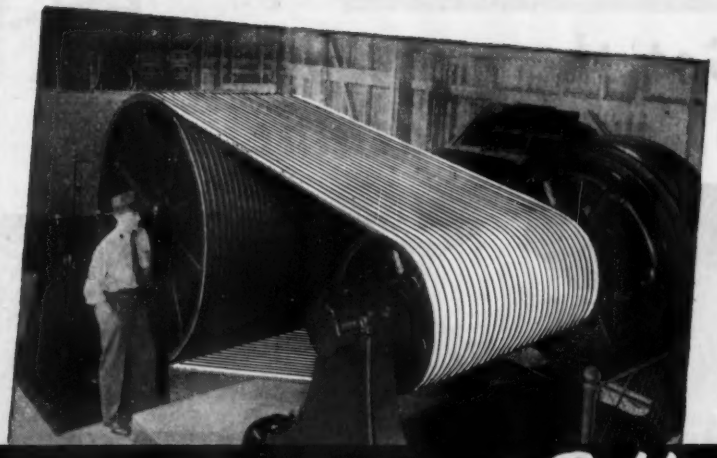
And there are still other cost-cutting advantages in the *American* brand of Phillips Screws . . . 3-point inspection of head, thread and point, to give you highest "perfection-percentage" in every lot of screws shipped . . . and American engineering experience to solve your special fastening problems. Try American Phillips Screws yourself . . . and see how they cut *your* costs, too.

AMERICAN SCREW COMPANY, PROVIDENCE 1, RHODE ISLAND

Chicago 11: 589 E. Illinois Street — *Detroit 2:* 502 Stephenson Building

PUT THE SCREWS ON THE JAPS . . . BUY WAR BONDS

AMERICAN PHILLIPS *Screws*



Here is a noteworthy fact

GATES *Synthetic Rubber* V-Belts

—are *TODAY* delivering *BETTER SERVICE* than *Pre-War* Belts of *NATURAL RUBBER!*

—and here's the reason behind it

Every day, on battlefields all over the world, U. S. Army tanks, tractors and self-propelled big guns are giving Gates V-belts a severity of service that no belts built before the war could possibly stand. Gates developed these combat-unit V-belts through specialized research and is building them entirely of synthetic rubber!

The importance of this fact to industrial V-belt users is this—

● Every improvement developed by Gates for these Army V-belts has also been added, day by day, to the quality of the standard Gates Vulco Ropes which have been delivered to you.

In many other products, as you know, war-time improvements must be withheld from general use until after the war is won. Gates V-belts are a notable exception to this rule for the simple reason that Victory depends upon production and production depends upon V-belts to drive the producing machines. That is why Gates has been able to give you immediately in your standard Gates Vulco Ropes, every V-belt improvement which Gates specialized research has developed for used on the Army's motorized equipment.

It is because of these facts that the Standard Gates Vulco Ropes you are now getting are giving you better service than any V-belts that were ever built before the war.

THE GATES RUBBER COMPANY

Engineering Offices and Jobber Stocks in All Large Industrial Centers

THE MARK OF Gates SPECIALIZED RESEARCH

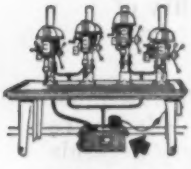
455

GATES VULCO ROPE DRIVES

CHICAGO 6, ILL. 549 West Washington. NEW YORK CITY 3, 215-219 Fourth Avenue ATLANTA 3, GA., 738 C. & S. National Bank Bldg.
LOS ANGELES 21, CAL., 2240 E. Washington Blvd. DENVER 17, COLO., 999 S. Broadway DETROIT 4, MICH., 8663 Grand River Ave.
PORTLAND 9, ORE., 333 N.W. 5th Ave. DALLAS 2, TEXAS, 1710 N. Market St. SAN FRANCISCO 3, CAL. 1090 Bryant St.

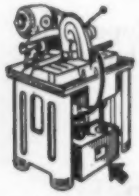
use GRAY-MILLS *portable* COOLANT SYSTEMS

to prolong tool life . . . improve finish . . . increase production



DRILL PRESS

Productive capacity of drill press increased by addition of this Gray-Mills Coolant System. Write for details...today.



DELTA CUT-OFF SAW

Work is speeded up on this Delta cut-off saw by use of Gray-Mills system for supplying coolants.

On the lathes pictured above, and on other machines having no built-in coolant system —Gray-Mills Coolant Systems are the simple, effective and economical means of applying coolants or cutting oils. Used on grinders, drill presses, abrasive cut-off machines, lathes, metal cutting band saws, milling machines, etc., Gray-Mills Systems apply coolants in controlled volume, either constantly or intermittently. The increased production, longer tool life and improved finish that result will quickly pay for these easily installed, inexpensive Gray-Mills Coolant Systems.

Available in a variety of models, and with complete pans and fittings, for every requirement. Write for details and prices.

GRAY-MILLS CO.
1953 Ridge Avenue, Evanston, Illinois

GRAY-MILLS

Complete Portable
COOLANT SYSTEMS
FRACTIONAL H. P. PUMPS • PARTS CLEANING SYSTEMS
INDUSTRIAL FLUID REFRIGERATING SYSTEMS

NEW PRODUCTS

AGITOR Parts Washer—with Air Agitation—Works 3 Ways

This new "Agitor" Parts Cleaning System provides efficient, speedy cleaning of various machine parts, assemblies, dies and work to be repaired. It reduces cleaning time and enables mechanics to work more efficiently. Used in 3 ways:

1. Soak cleaning with Air-gitator "boiling" action of the (cold) solvent.
2. Small parts are easily swished by hand in revolving Swisher Basket.
3. Hose-cleaning by means of a powerful pump.

Many of these systems are now in operation in machine shops, repair shops and so forth, and have proved their ability to pay for themselves in time and labor savings. Write for literature.

GRAY-MILLS CO., 1953 Ridge Ave., Evanston, Ill.

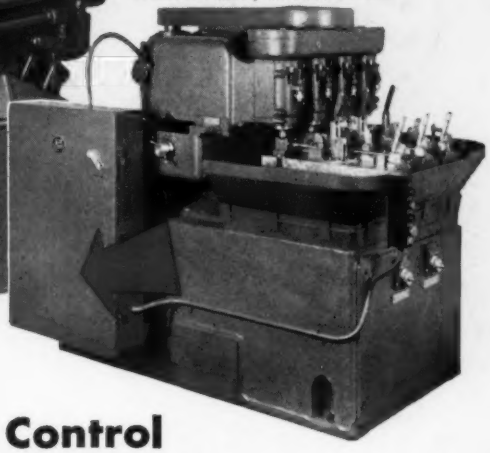
SUPERFLO Centrifugal Pumps—Deliver more volume per horsepower

These new Superflo Pumps for coolants, cutting oils and lubricants, can be easily adapted to any machine and on the job, they will give dependable, service free performance. They are especially designed to deliver more volume per horsepower and in many cases a Superflo 1/8 H. P. model delivers a volume comparable to many 1/4 H. P. pumps. Their streamlined design and compactness make them an attractive addition to any machine. They are available with , 1/4, 1/8 and 1/25 horsepower motors in capacities from 9 to 75 gallons per minute. Send for details.

GRAY-MILLS CO., 1953 Ridge Ave., Evanston, Ill.

SPECIAL PANELS

SNYDER TOOL & ENGINEERING CO., Detroit, Mich. A-B special panel is convenient for installation and inspection.



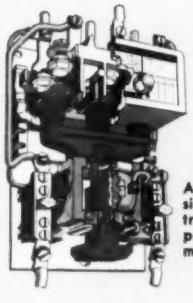
LEMAIRE TOOL & MFG. CO., Dearborn, Mich. Vertical milling machine with A-B special panel. Note the handy location of safety disconnect switch.

Correct Sequence Control
Greater Safety for Operators
Lower Maintenance Costs

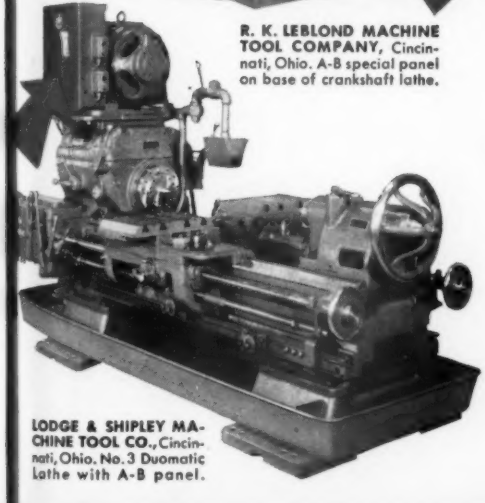
The advantages of automatic electric control cannot be fully realized unless relays, starters, timers, etc., are mounted on a special control panel...engineered to fit a particular machine. Wiring errors are virtually eliminated, correct sequence operation is assured, and installation costs are reduced. With centralized control, inspection is easy.

Follow the example of leading machinery builders and submit your machine tool control problems to Allen-Bradley engineers.

Allen-Bradley Company
1316 S. Second St., Milwaukee 4, Wis.

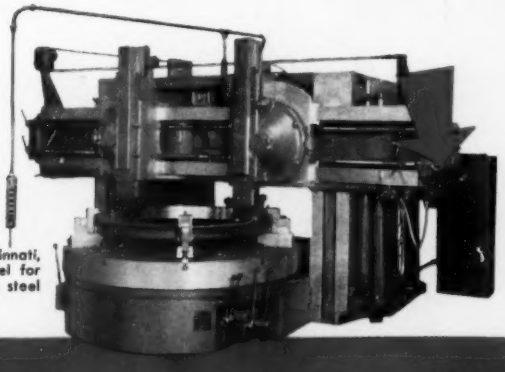


The keystone of all A-B special panels is the simple A-B Solenoid Control. Only one moving part. There is no contact maintenance.



R. K. LEBLOND MACHINE TOOL COMPANY, Cincinnati, Ohio. A-B special panel on base of crankshaft lathe.

LODGE & SHIPLEY MACHINE TOOL CO., Cincinnati, Ohio. No. 3 Duomatic Lathe with A-B panel.



CINCINNATI PLANER CO., Cincinnati, Ohio. A-B special control panel for boring mill is in self-supporting steel cabinet.

A-B

ALLEN-BRADLEY

CONTROL PANELS FOR MACHINE TOOLS

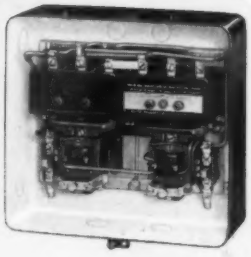
QUALITY

THE ALLEN-BRADLEY LINE OF SOLENOID STARTERS

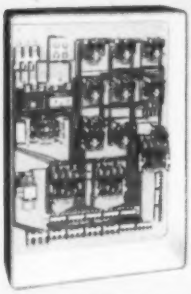
SIMPLE DESIGN • SILVER ALLOY CONTACTS • TROUBLE-FREE OPERATION

Bulletin 702
Solenoid Contactor

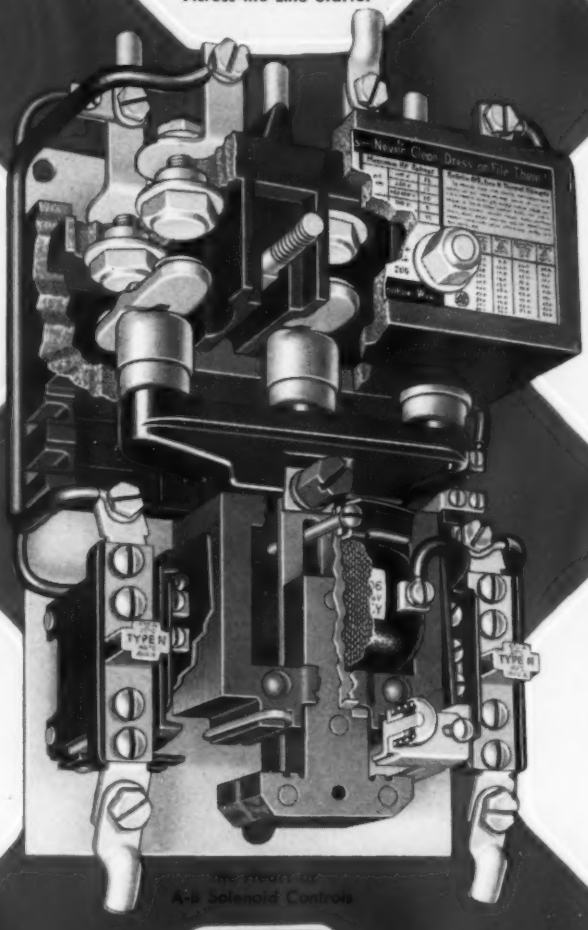
Bulletin 709
Across-the-Line Starter



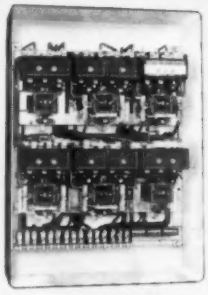
Bulletin 705
Reversing Switch



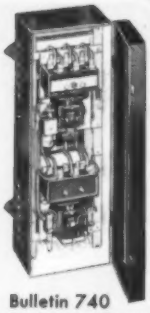
Special Panels
for Machine Tools



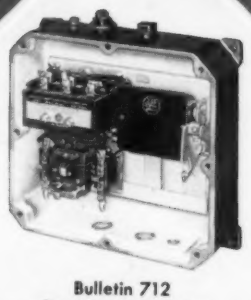
The Heart of
A-B Solenoid Controls



Bulletin 715
Multi-Speed Starter



Bulletin 740
Auto. Resistance Starter
Velvet-Smooth Acceleration



Bulletin 712
Combination Starter
in Watertight Enclosure

The design of Allen-Bradley controls follows a uniform pattern throughout the entire line. The basic unit is the standard A-B solenoid switch, available in six sizes and a maximum rating of 150 amperes. All have only one moving part. All have silver alloy contacts. There is no contact maintenance. Such standardization and simplicity guarantee trouble-free performance. That is the experience of all users of Allen-Bradley solenoid motor control.

MOTOR CONTROLS FOR ALL INDUSTRIES

A-B Quality

ALLEN-BRADLEY

QUALITY

NUTS to the axis

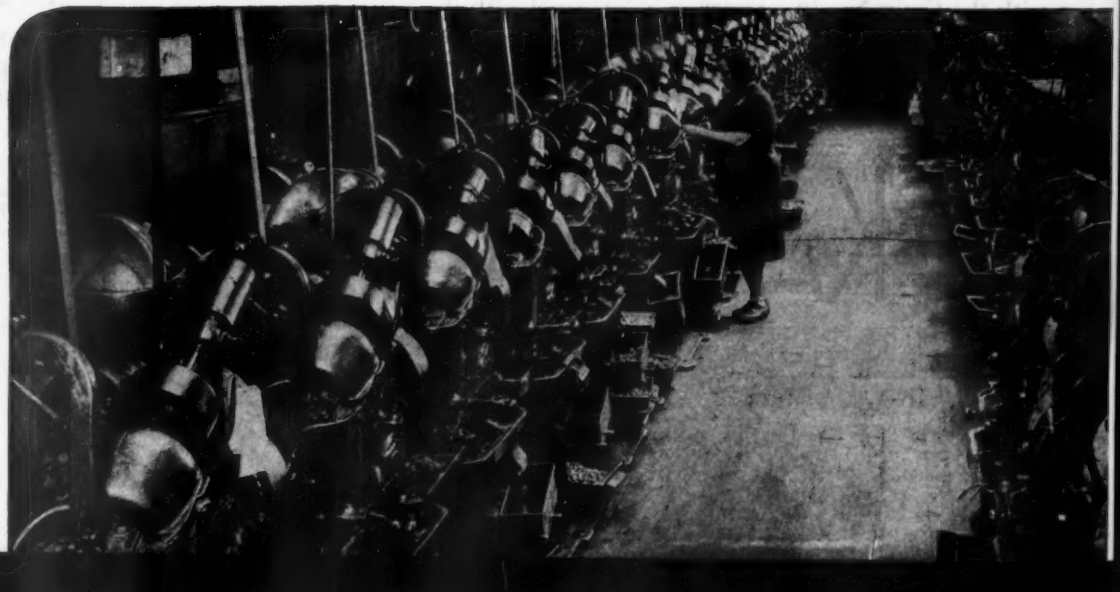
TODAY the dependability of circle Ⓑ fasteners is being proven in nearly every allied weapon used in this global war. Give a thought to this when you are planning your blueprints for tomorrow.

BUFFALO BOLT COMPANY

NORTH TONAWANDA, NEW YORK

SALES OFFICES IN PRINCIPAL CITIES

Ⓑ



● A section of one battery of nut makers which produces thousands of circle Ⓑ nuts daily—in various shapes and sizes.

Contact KAYDON of Muskegon

FOR ALL TYPES OF BALL AND ROLLER BEARINGS 4" BORE TO 120" OUTSIDE DIAMETER

2
3
The CROSS Shell Lathe Uses
KAYDON Precision-Made Bearings
1
A The Cross Spindle uses two KAYDON Roller Bearings and one Ball Bearing.

1 KAYDON Ball Thrust Bearing (4.9213" x 6.8898" x 1.831")

2 KAYDON Roller Thrust Bearings (5.002" x 9.968" x 2.000") with laminated Plastic Cage.

3 KAYDON Radial Roller Bearing (7.0866" x 11.0236" x 2.9134")

THE outstanding productive capacity, ultra-smooth spindle rotation and load absorbing properties of the Cross No. 10 Shell Lathe are due, in part, to the use of KAYDON Engineered Bearings that meet the exacting requirements of this machine.

No other shell lathe is capable of results achieved with the Cross No. 10. KAYDON was entrusted with the design and manufacture of the bearings — matching the unsurpassed skill of Cross designers with "engineered" KAYDON Bearings.

KAYDON specializes in the production of all types and sizes of ball and roller bearings from 4" Bore to 120" O. D. In addition, KAYDON provides atmospheric control in heat-treating as well as flame hardening, precision heat-treating, metallurgical laboratories, microscopy and physical testing.

• • •

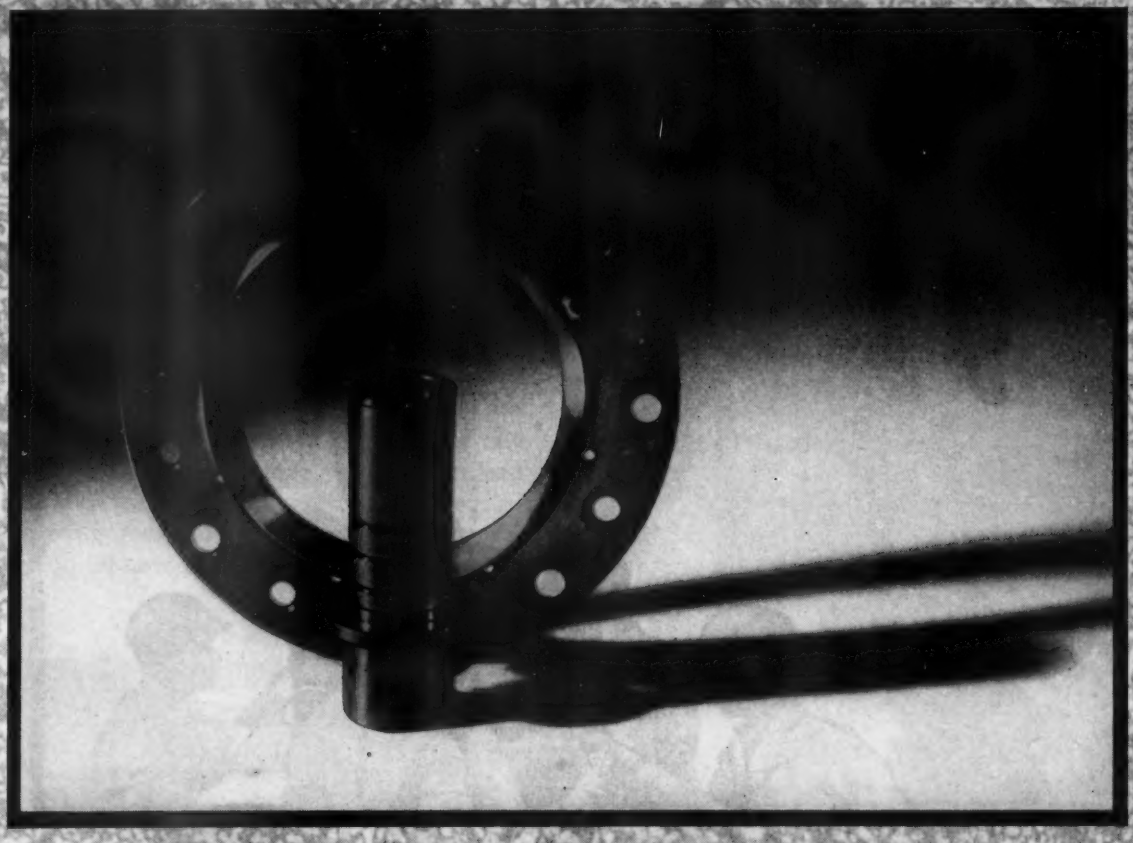
Counsel in confidence with KAYDON. Capacity is available for production of all types and sizes of KAYDON Bearings. Look ahead — plan ahead — with KAYDON!

KAYDON *Types of Standard or Special Bearings:*
Spherical Roller • Taper Roller
Ball Radial • Ball Thrust
Roller Radial • Roller Thrust

THE KAYDON ENGINEERING CORP.

MUSKEGON • MICHIGAN

New in Name . . . Old in Experience



Bunting Cast Bronze Bearings have endless variety —stock or special, simple, complicated, standard or precision, usual, unusual—Bunting alloys or your own. Look to Bunting for your bearing specifications of tomorrow. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Warehouses in principal cities.

Bunting

BRONZE BEARINGS ☆ BUSHINGS ☆ PRECISION BRONZE BARS

It's as simple as that!

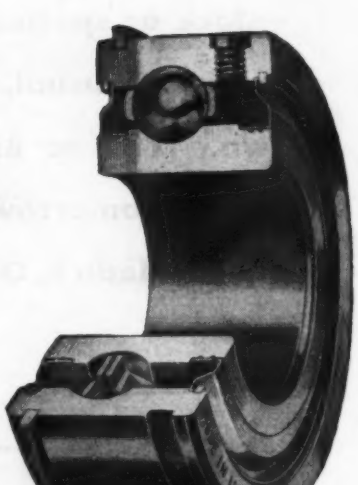
If it's a gun, you simply open the breech—insert the shell or cartridge—close the breech—and you're ready to fire.

If it's a motor or machine, you just slip the "CARTRIDGE" BEARING into its housing—assemble the housing—and you're ready for operation.

Yes—the "CARTRIDGE" BEARING is as complete and self-contained, functionally, as a rifle cartridge or gun shell—fully charged, at the factory, with a heavy load of NORMA "STABILITY-TESTED" GREASE; self-sealed against loss of lubricant or intrusion of dirt.

No fussy fitting—no loose parts—no messy grease "plumbing"—no chance for looseness—no running dry, no wear—

It's as simple as that!



PATENTED

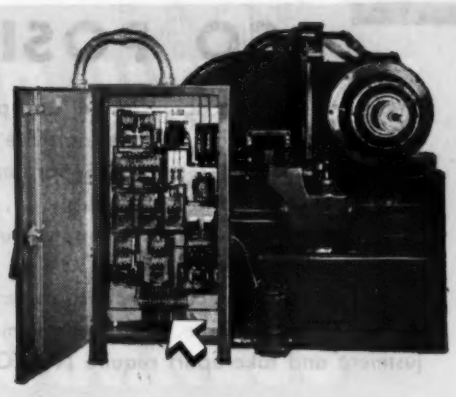
NORMA-HOFFMANN BEARINGS CORP'N. STAMFORD, CONN. *Founded* 1911

Field Offices: NEW YORK • CHICAGO • CLEVELAND • CINCINNATI • PITTSBURGH • DETROIT • LOS ANGELES • SAN FRANCISCO • SEATTLE, WASH.

Here's Why MORE AND MORE MACHINE TOOL USERS ASK FOR...

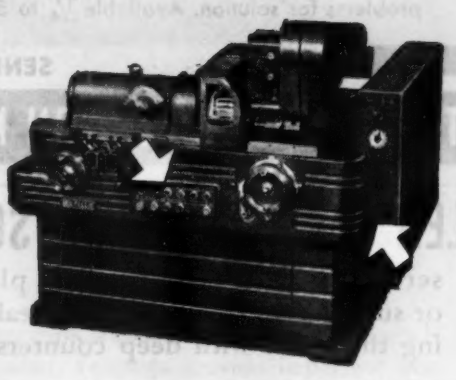
Square D Control

Because the Square D line of machine tool control is so unusually complete, practically any performance requirement can be met with standard devices. These standard devices, designed to perform many different functions, are physically proportioned to make up compact, attractive control panels.



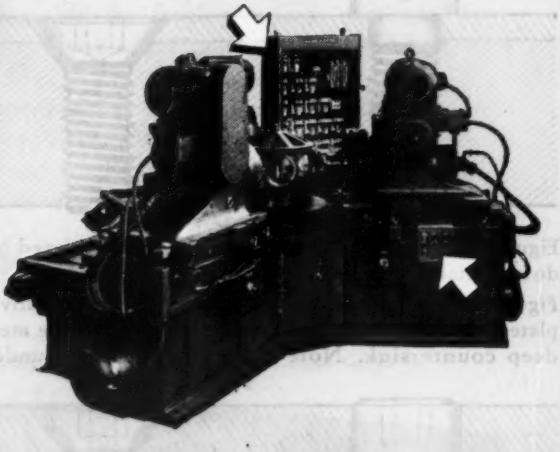
Square D Control

Magnetic starters and contactors, vertical action type, are designed specifically for the exacting requirements of machine tool control which include ample electrical capacity, fast response and long mechanical life. Square D accessories include push buttons, precision limit switches, pneumatic timing relays and terminal blocks.



Square D Control

Square D Field Engineers have had years of experience in designing electrical control for machine tools. They are fully qualified to work out line diagrams for desired operation sequences. Their suggestions are carefully analyzed and confirmed by factory engineering departments with complete research and testing facilities at their command. This Field Engineering Service is available, at no cost, through Square D branch offices in 50 principal U. S. and Canadian cities.



SQUARE D COMPANY

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TRADE
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Floating Disc CLUTCHES

SO POSITIVE IN ACTION

There's no question about instant and positive engagement and disengagement when machine tools are equipped with Maxitorq Clutches. Patented Maxitorq Separator Springs, between the discs, keep them apart in neutral . . . prevent excessive drag, abrasion or heat so common in many clutches of the multiple disc type. Engagement is easily controlled with light pressure. Assembly and dis-assembly of clutch are made easy by means of a patented Locking Plate. Everything is manual . . . assembly, adjustment and take-apart require NO TOOLS.

Single or Double—Wet or Dry

DOUBLE TYPE CLUTCH

If you build or use any type of machinery that requires clutches, investigate Maxitorq . . . give us your problems for solution. Available 1/4 to 5 H.P. at 100 R.P.M. Larger capacities to order.

SEND FOR CATALOG NO. A1

THE CARLYLE JOHNSON MACHINE COMPANY · MANCHESTER, CONNECTICUT

ALLEN FLAT HEAD CAP SCREWS

set up *flush* in holding thin plates or superposed parts, without weakening the metal with deep countersink.

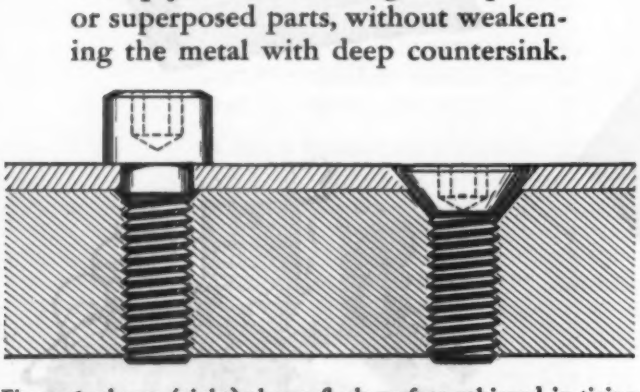
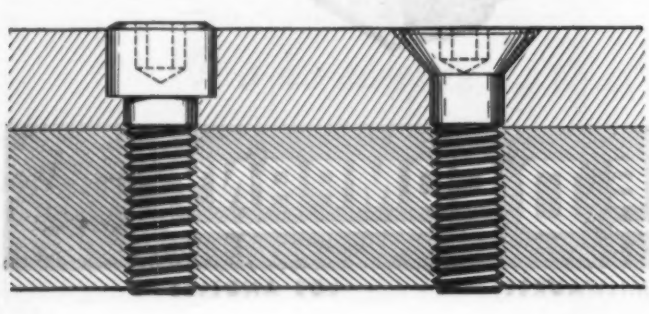


Figure 1, above, (right) shows flush surface achieved in tieing down metal piece thinner than head height of screw.

Figure 2, below, shows advantage in fastening relatively thin plate to retain flush surface without weakening the metal with deep countersink. Note more binding surface under head.



ALLEN USAGE

Here's the way to apply ALLEN holding-power to comparatively thin plates where a flush top surface must be achieved, with no gap between screw head and surrounding metal.

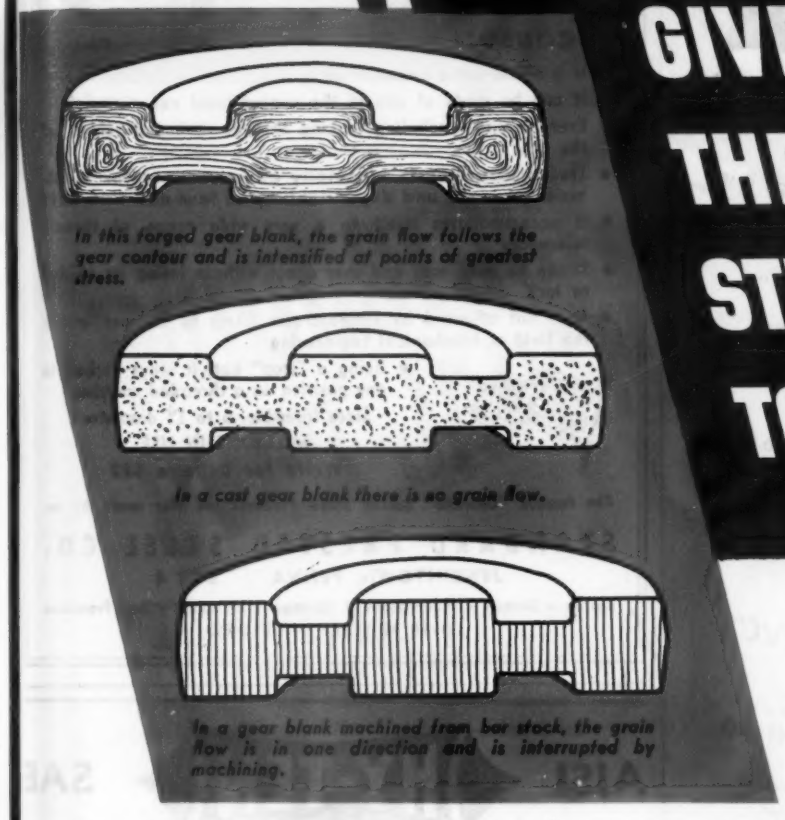
Note that top piece of metal in Figure 1 is thinner than head height of the Flat Head Cap Screw. There's more binding surface under the head than is the case with a projecting-head screw, and the angle helps lock the screw in place by drawing down on a conical surface.

Figure 2 shows application in a comparatively thicker plate. Here the flush surface is retained without weakening the metal with a deep countersink. Maximum strength in the screw itself is assured by "pressur-forming" of special-analysis ALLENOY steel.

Your local Allen Distributor will supply you with samples to try out these signal advantages of our Flat Head Cap Screws. Ask him or write us. Engineering data on request.

THE ALLEN MANUFACTURING COMPANY
HARTFORD 1, . . . CONNECTICUT, U. S. A.

Why FORGING GIVES METALS THEIR ULTIMATE STRENGTH and TOUGHNESS



In this forged gear blank, the grain flow follows the gear contour and is intensified at points of greatest stress.

In a cast gear blank there is no grain flow.

In a gear blank machined from bar stock, the grain flow is in one direction and is interrupted by machining.

The sketches portray the fundamental character of forgings as compared with parts produced by other methods. Only in forgings will you find the tough fibrous grain structure, with the grain flow advantageously directed throughout the piece, and the fibre structure concentrated at the points of greatest shock and stress.

Here is the "secret," known to hammersmiths for hundreds of years, of the far greater resistance of forgings to tensional and torsional stresses. As forgings are metal in an intensely compressed state, they are likewise highly resistant to compression and impact. Forged parts also rank high in fatigue resistance and useful life. Measured in service per dollar expended, forgings are economical.

For the advanced, speedier and more trouble-free machines of tomorrow, a broader use of forged parts is definitely indicated. Forgings provide important savings in weight because parts of smaller sectional thickness may be safely used. Forgings require a minimum of machining, and the forging process eliminates internal defects which might cause sudden breakdown or failure.

When you need flat die, drop or upset forgings, let our more than a hundred years of experience help you as it has hundreds of aircraft and ordnance builders during the war era.

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5301 W. Roosevelt Road
Chicago (50), Illinois
Engineering Representatives in Principal Cities

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ARMY ★★ E ★★ NAVY

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• It is PIONEER Model "VC"—one of the great PIONEER family of more than 400 standard models. Perhaps it is just the coolant pump you need for a particular operation. Many of these "VC" models are now in use .... on busy production machines .... doing a dependable day-in-day-out job.

• Like all of the PIONEER 400 standard models, the "VC" is a long-life pump .... designed by production specialists .... with quality through and through.

PIONEER MODEL "VC"
(VERTICAL)

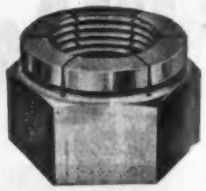
SEAL-LESS PUMP . . . FOR EXTERNAL MOUNTING

Model "VC" is mounted integral with a heavy-duty, long-hour, totally enclosed, ball-bearing motor. Due to PIONEER construction, shaft whipping is eliminated. Intake is above the impeller—suction is from the motor end down. Coolant cannot surge up the shaft with intermittent operation of the pump. An ideal application for grinding, honing, lapping, super-finishing and sanding machines. There is no metal-to-metal contact of any moving parts, therefore no wear from abrasives or grinding grits.

PIONEER Pumps
HIGH EFFICIENCY • LOW POWER CONSUMPTION
GREATER VOLUME AND LESS MAINTENANCE

Pioneer Pump & Manufacturing Co.
19651 JOHN R ST. • DETROIT 3, MICHIGAN

Why you Should order the FLEXLOC STOP and LOCK NUT



Pat'd—Pats. Pend.

Because:

- It is of one-piece construction
- It can be made of any of the conventional nut materials
- Every thread—including locking threads—takes its share of the load
- Its construction is especially advantageous for maximum strength and dependability of low and thin nuts
- It accommodates itself to a very wide range of thread tolerances
- It can be used over and over again without losing its ability to lock
- It is not affected by temperatures likely to be met within the field of Mechanical Engineering

- Being a "stop" nut, it stays locked in any position on a threaded member.

Sizes from No. 6 to 1" diameter
MILLIONS IN USE
Write for Bulletin 582

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THAT'S what it amounts to when our B-29 fortresses pay Hirohito a visit. For in these mighty ships are vital die cast parts made by Auto-Lite in their Die-Casting Plant at Woodstock, Illinois.

There are complete facilities, at Woodstock, for zinc and aluminum die casting, production and precision machining, a wide variety of finishes and a completely modern testing laboratory. Such integration of manufacture simplifies your job of production, makes more certain the meeting of your requirements in precise detail.

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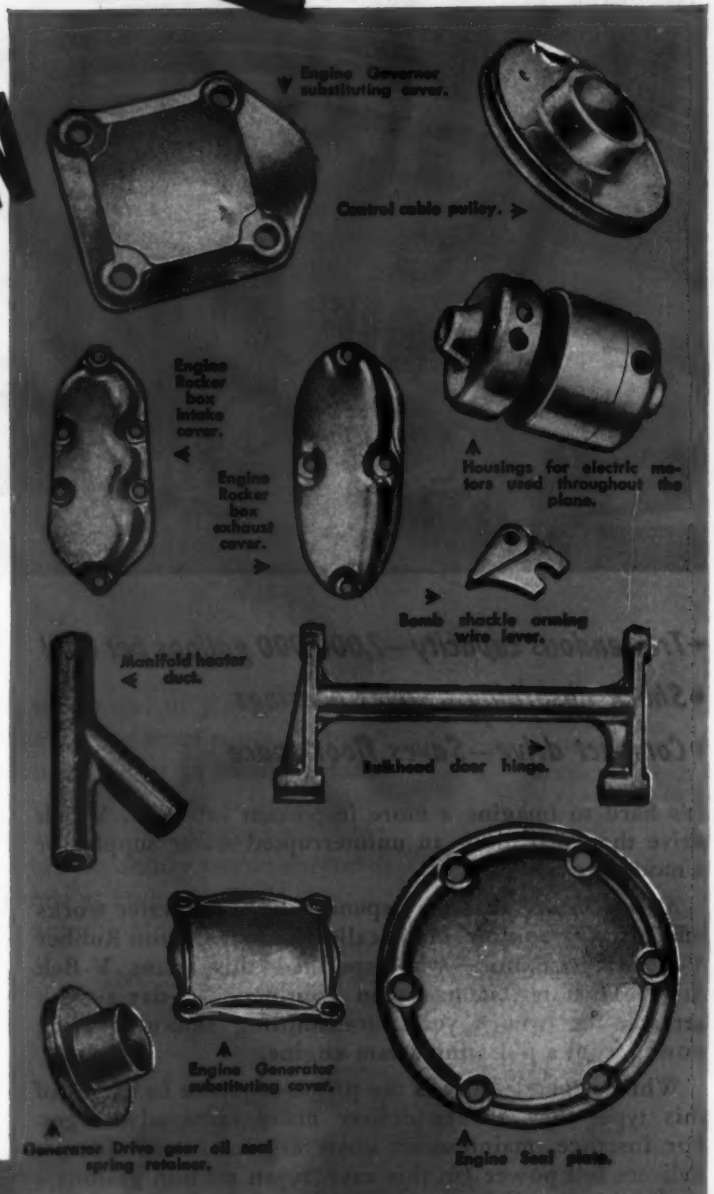
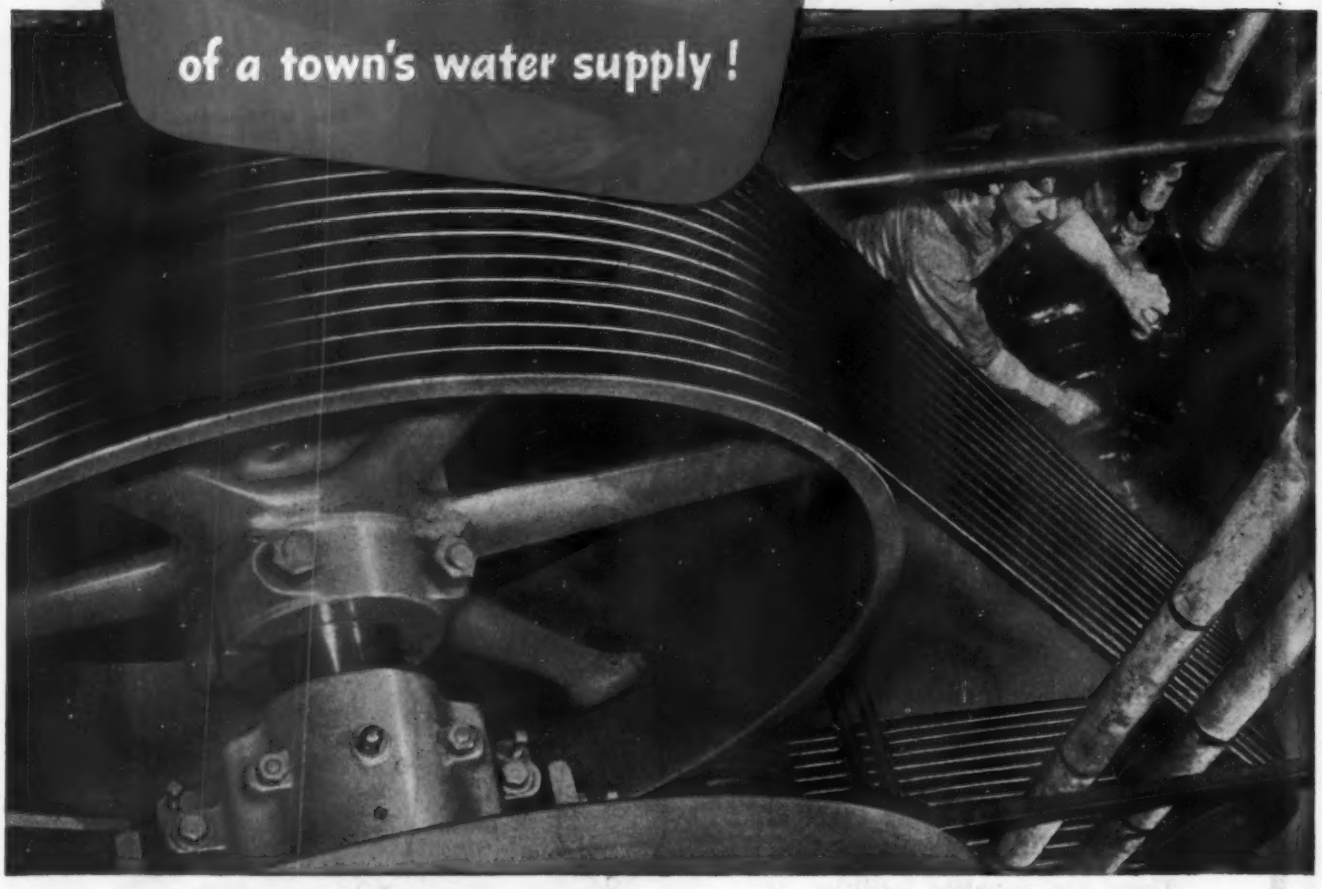

Engine Governor substituting cover.
Control cable pulley.
Engine Rocker box intake cover.
Engine Rocker box exhaust cover.
Housings for electric motors used throughout the plane.
Bomb shackle arming wire lever.
Manifold heater duct.
Bulkhead door hinge.
Engine Generator substituting cover.
Generator Drive gear oil seal spring retainer.
Engine Seal plate.

AUTO-LITE Die Casting

THE WATCHDOG
of a town's water supply!



- *Tremendous capacity—7,000,000 gallons per day!*
- *Shock absorbing—Saves bearings*
- *Compact drive—Saves floor space*

It's hard to imagine a more important job for a V-Belt drive than providing an uninterrupted water supply for a modern city!

And to insure absolute dependability—the water works officials in Brookline, Mass. called in their Dayton Rubber V-Belt Distributor—who specified this giant V-Belt drive. Thus far, it has seen continuous 7-day-a-week service, for over 4 years, transmitting smooth-flowing power from a pulsating steam engine.

While dependability is the prime requisite in drives of this type—they always deliver many *extra* advantages. For instance, maintenance costs are less. And since it delivers full power (in this case, seven million gallons a day) with less belt tension, bearing wear is greatly reduced. Dayton V-Belt drives permit closer distances between drive and driven centers, thus a more compact installation of power is permitted—saving much valuable floor space.

Your Dayton V-Belt Distributor can bring you advantages like this—in *your* plant. It will pay to investigate

Dayton's three *exclusive* advantages:

1. Dayton Rubber, as World's Largest Manufacturer of V-Belts, offers you vast experience in Power Transmission Engineering.

2. This experience is made available to you through trained specialists in your Dayton V-Belt Distributor's Organization.

3. The technical excellence of Dayton Rubber gives you V-Belts pronounced unsurpassed both in mechanically correct design and in quality of construction.

Call *your* Dayton V-Belt Distributor! Ask how Dayton Power Transmission Engineering can help you.

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DAYTON 1, OHIO
THE WORLD'S LARGEST MANUFACTURER OF V-BELTS

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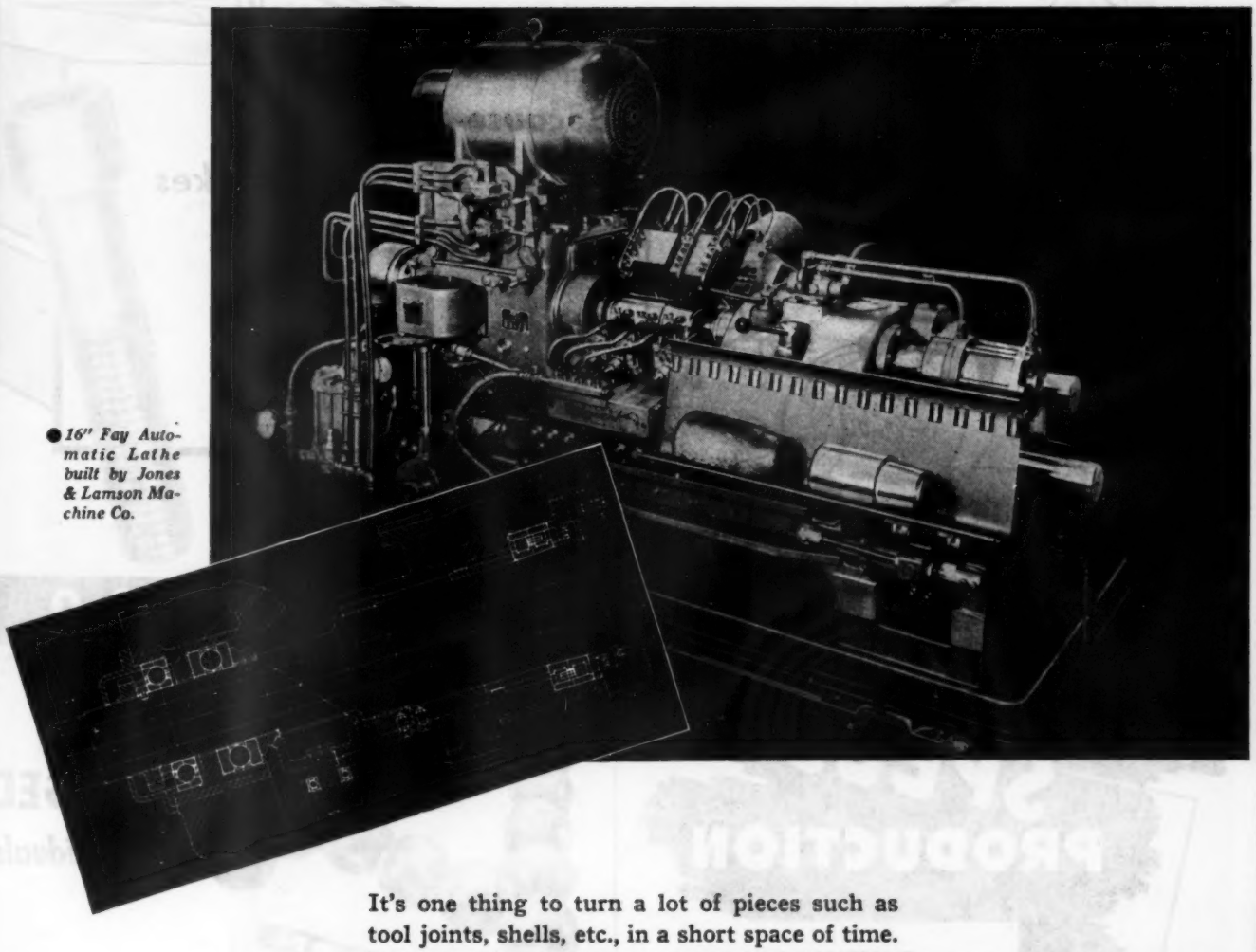
THE MARK OF TECHNICAL EXCELLENCE IN SYNTHETIC RUBBER

FOR *Fast* PRODUCTION WORK



● *16" Fay Automatic Lathe built by Jones & Lamson Machine Co.*

It's one thing to turn a lot of pieces such as tool joints, shells, etc., in a short space of time. But it's quite another matter to turn 'em fast and *uniformly accurate.* To do that, a lathe must have a spindle mounting that brings *rigidity* to the work piece—plus the ability to run chatter-free under heavy cuts at high speeds. It should have the SKF Spindle Mounting.

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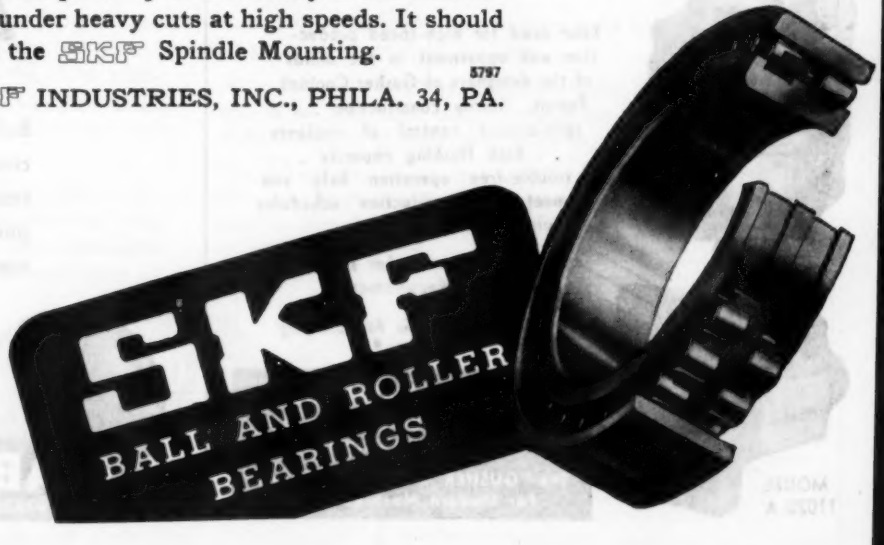
● *The SKF Double Row Cylindrical Roller Bearing with Tapered Bore.*



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Because . . .
***Mac-it* Process makes**
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Mac-it Products Include: Socket Head Cap Screws, Hollow Set Screws, Hexagon Head Cap Screws, Square Head Set Screws, Stripper Bolts, Hexagon Socket Pipe Plugs.

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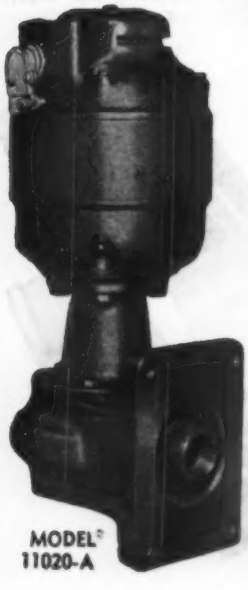

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DOES ROTO-FINISH DE-BURR AND FINISH PARTS UNIFORMLY?

***A user answers: "We have come to respect Roto-Finish as a precision Grinding Operation..."**

No heartier recommendation for the Roto-Finish Method of de-burring can be made than that above. It is typical of many comments received as to absolute uniformity produced by Roto-Finish on parts of steel, brass, aluminum, magnesium, stainless and nickel steels.

Because it is a mechanical method, Roto-Finish de-burrs and finishes much faster; it provides for more economical labor. But Roto-Finish is also a precision process, which can be varied from severe grinding to fine surface finishing and thereby hold dimensions of all parts to exact specifications.

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Besides cutting costs, Roto-Finish precision will also help you produce a finer product. See for yourself by sending samples for processing. No obligation, either, in writing for bulletin on Roto-Finish. THE STURGIS PRODUCTS CO., 506 Jacob St., Sturgis, Michigan.

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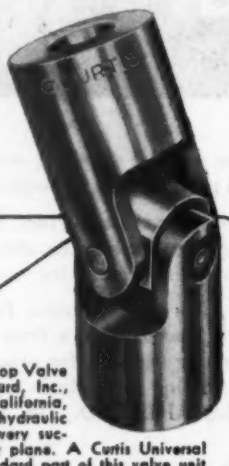
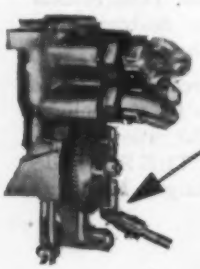
Curtis Engineers, with more than 20 years experience in designing universal joints for many and varied types of installations, are ready to work with you on your present or future plans.

Write for new Curtis Engineering data and drafting templates . . . both are valuable aids to your designers and draftsmen.





This Flap Stop Valve made by Vard, Inc., Pasadena, California, is part of the hydraulic system on a very successful fighter plane. A Curtis Universal Joint is a standard part of this valve unit which controls the circulation of hydraulic fluid.

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Class 3 Fit

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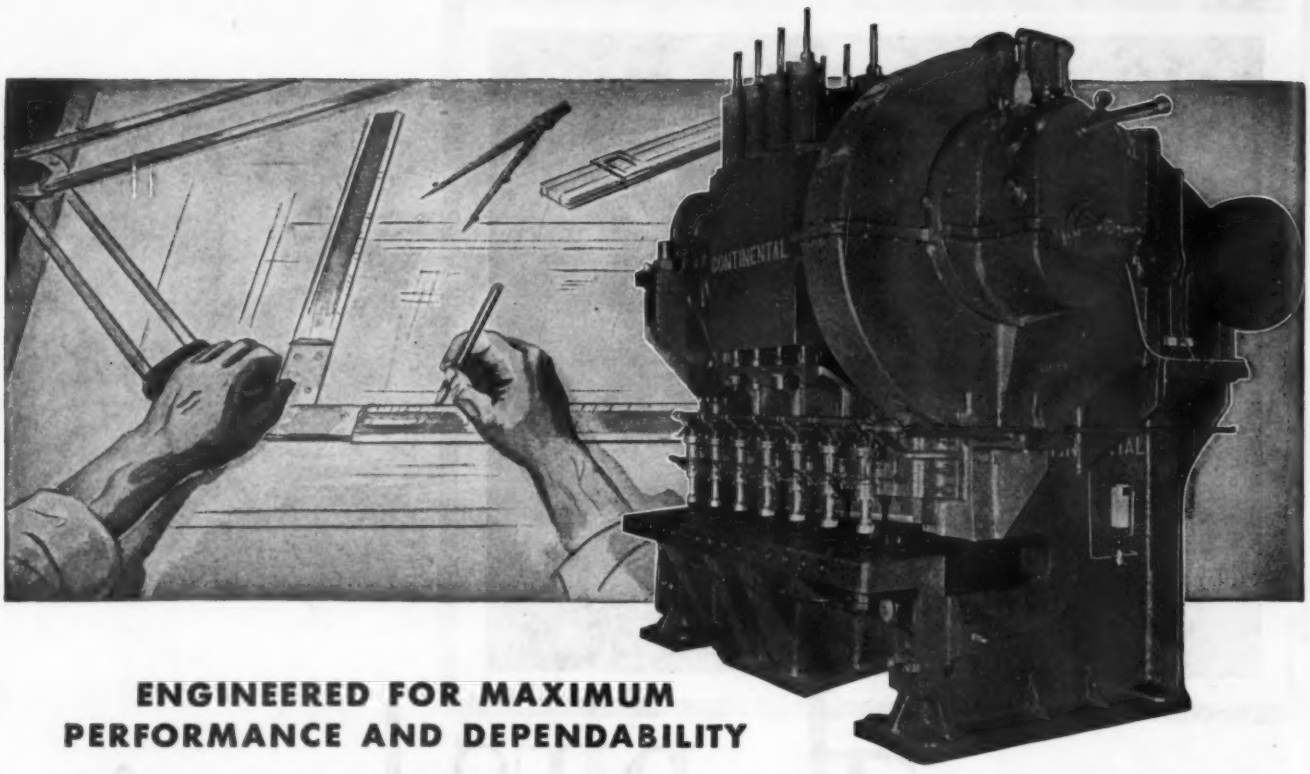
Mullins can PRESS it from METAL instead



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Offer many design and operating advantages that only Trabon can give you!

● Easy installation is the ***first*** advantage. A Trabon System requires a *single line* of piping only, minimizing installation time and cost.

Secondly, Trabon feeders are entirely enclosed. They have no moving outside parts to corrode or get bent. Trabon feeders do not employ any springs, diaphragms, check valves or levers, and consequently are *free operating* under *all* service and temperature conditions.

Third, the system is operated entirely by the flow of lubricant through the feeders. Although ample pressure is available to lubricate the tightest bearing, the system requires only enough pressure to overcome line resistance, and the load of the individual bearing being lubricated.

Fourth, Trabon Systems assure the positive lubrication of each connected bearing. The Trabon design requires that each feeder *must* discharge to its connected bearing *first* in order to open a port so the lubricant can flow onto the next feeder in the circuit. In a Trabon System, lubricant *positively cannot* pass by any bearing without lubricating it, and go on to the next bearing.

Fifth, because of this design, a *single indicator* placed at the pump where it can be easily seen, gives positive assurance that the entire system is operating properly, thus permitting the feeders to be located in the most advantageous position available, even though they be *hidden from view.*

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STRENGTH + flexibility
under TOUGHEST CONDITIONS
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Finest oil resistant synthetic tube and covering, reinforced with high tensile steel wire for rugged service and long life. Permanent machined couplings for high pressures. Re-usable couplings for low pressures.
Impervious to heat, cold and solvents. Stay put under extreme vibration and flexing. Recommended for short bends, high working pressures and working temperatures of −40° F. to 250° F.
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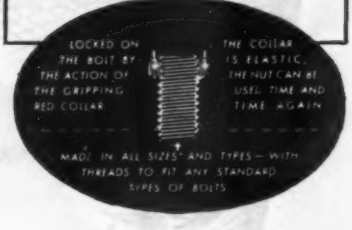
A HOLD-DOWN *for Keeps*

Elastic Stop Nuts have been successfully used for hold-down bolts where security is vital. They give a positive fastening wherever there is vibration, impact, shock, stress change. Let ussend an application engineer to discuss the Elastic Stop Nut way of avoiding nut failures that may be costly both in your plant equipment and your products.


LOCKED ON THE BOLT BY THE ACTION OF THE GRIPPING RED COLLAR
THE COLLAR IS ELASTIC; THE NUT CAN BE USED TIME AND TIME AGAIN
MADE IN ALL SIZES AND TYPES—WITH THREADS TO FIT ANY STANDARD TYPES OF BOLTS

This nut uses its head.

An Elastic Stop Nut carries its own insurance for a positive hold-down fastening — the elastic collar built into its head.

Here's how this device works:

The tough but resilient elastic collar forms itself to the individual bolt threads, grips them so tightly that the nut won't loosen up or back off even under the severest vibration.

Forget about cotter pins, lockwashers or any other auxiliaries when you use an Elastic Stop Nut. That means no chance of leaving off these extras as well as saving time in assembly and servicing.

Once on, an Elastic Stop Nut stays on. And it can be used over and over again without losing the grip of its headpiece.

Result: Economy in production and economy in use.

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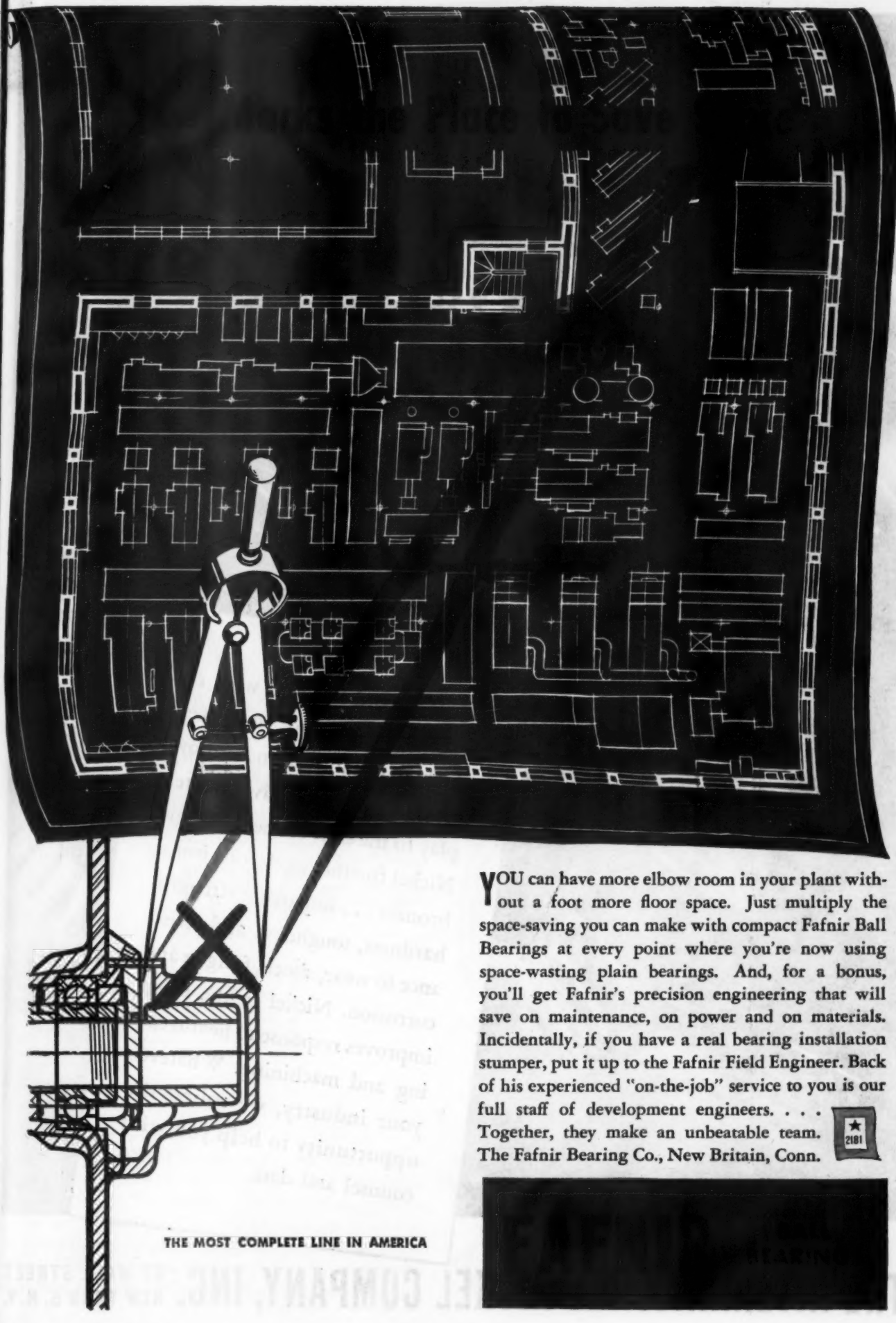
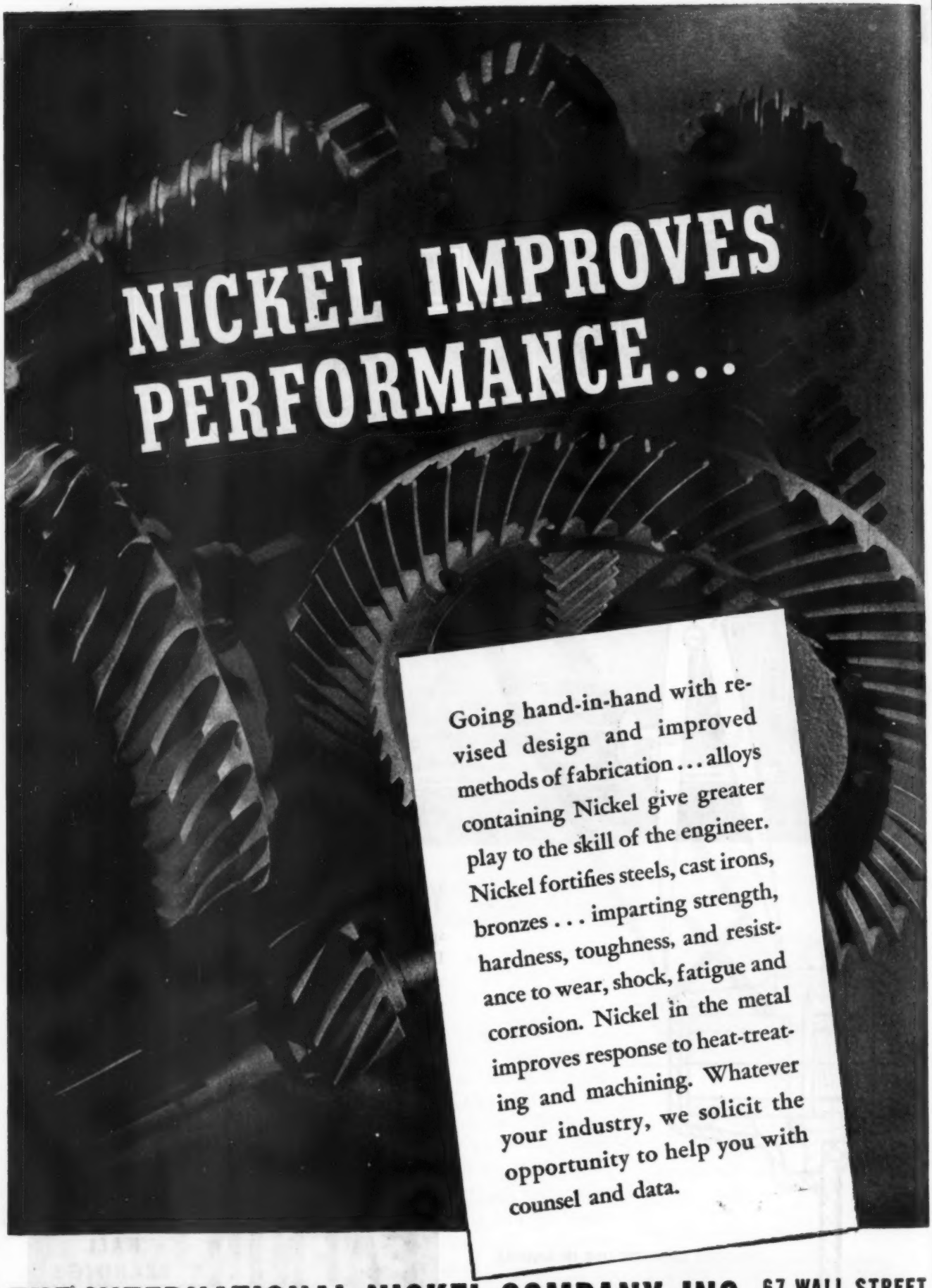
ELASTIC STOP NUTS
Lock fast to make things last



YOU can have more elbow room in your plant without a foot more floor space. Just multiply the space-saving you can make with compact Fafnir Ball Bearings at every point where you're now using space-wasting plain bearings. And, for a bonus, you'll get Fafnir's precision engineering that will save on maintenance, on power and on materials. Incidentally, if you have a real bearing installation stumper, put it up to the Fafnir Field Engineer. Back of his experienced "on-the-job" service to you is our full staff of development engineers. . . . Together, they make an unbeatable team. The Fafnir Bearing Co., New Britain, Conn.

THE MOST COMPLETE LINE IN AMERICA



Going hand-in-hand with revised design and improved methods of fabrication... alloys containing Nickel give greater play to the skill of the engineer. Nickel fortifies steels, cast irons, bronzes . . . imparting strength, hardness, toughness, and resistance to wear, shock, fatigue and corrosion. Nickel in the metal improves response to heat-treating and machining. Whatever your industry, we solicit the opportunity to help you with counsel and data.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

Sketched in the Philippines
by Coast Guard Combat Artist John Floyd Morris. Free, enlarged reproductions of this striking study of a typical U. S. sailor, in full color, for framing, will be mailed on request. No advertising matter.

TOUGH CUSTOMER for the Japs . . . and the nation's pride he's the typical American sailor. He's also Star's "customer" today. The landing craft, destroyers, cruisers, carriers, and battlewagons manned by the U. S. Navy and their Coast Guard comrades need *tough* motors, and plenty of them. Until his job is done, we'll be busy making the motors that will help him speed Victory. But soon, we believe, Star will be able to handle *your* tough motor building assignments. Star Electric Motor Co., 216 Bloomfield Avenue, Bloomfield, New Jersey.

STAR MOTORS
POWER PACKAGED AS YOU NEED IT

Are **YOU**

Keeping Up with

SPEED CASE STEEL?

The ONE Steel which will Replace 6 Other Steels* and which will . . .

- MACHINE at 230 to 250 SFPM
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- Give you DUCTILITY equal to C1019
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Write us for full details of this revolutionary steel. Our metallurgists are at your service.

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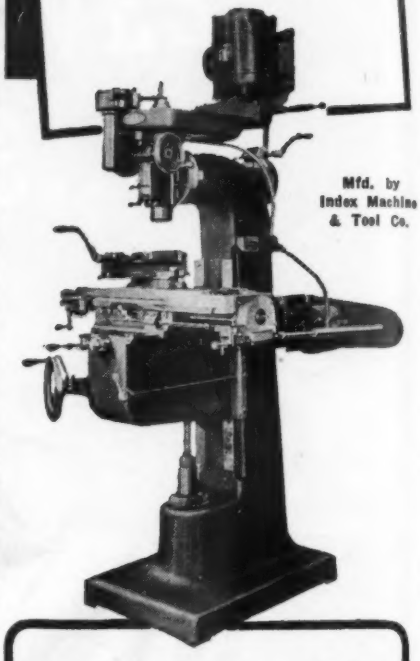
MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

INDEX MILLS

will help you on your tool, die and production work. In addition to micrometer dials on screws, verniers are standard equipment for cross and longitudinal locating. If finer precision is desired, rods and indicators are available. These in conjunction with power feed to a precision ball bearing spindle make a very versatile machine for milling, drilling and boring. *Literature promptly mailed on request.*



Mfd. by Index Machine & Tool Co.

12" Tool Room Rotary Table

Mfd. by Index Machine & Tool Co.

A quality tool for precision work in the tool room or production line, incorporating such features as ball bearings—hardened and ground worm—quick acting throw-out for free hand turning—single movement table lock that does not cramp table out of alignment—compound trough. 12" size only.

For use on Index Mills or any other machine that will accommodate a 12" table.

BLANK and BUXTON MACHINERY

3100 E. MICHIGAN AVE.
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Extra Long Life

Many factors determine the *real* cost of a bearing. Very often the one with the lowest purchase price is the most costly to buy. To determine real value you start with the selling price. Then add the installation costs . . . plus the type of performance delivered . . . plus the length of service. Add all of these and you learn your true cost. The most expensive bearing is the one that fails.

No matter how you compare Johnson ELECTRIC MOTOR Bearings you will find them tops. Correct in design and tolerance, they slip right into place with a minimum of effort. Cast in a special high-lead alloy, they deliver smooth, quiet performance with a minimum of attention. When properly installed and lubricated they usually outlast the motor.

Why not try a set on your toughest job? Test them in comparison to any you have ever used. See for yourself why Johnson Electric Motor Bearings are your most economical buy. Reasonably good service is available from stock.

Catalogue

76 Pages—fully illustrated—describes the most complete bearing line on the market. Write for a copy.

JOHNSON BRONZE

SLEEVE BEARING HEADQUARTERS

The MOST COMPLETE SLEEVE BEARING SERVICE in the WORLD

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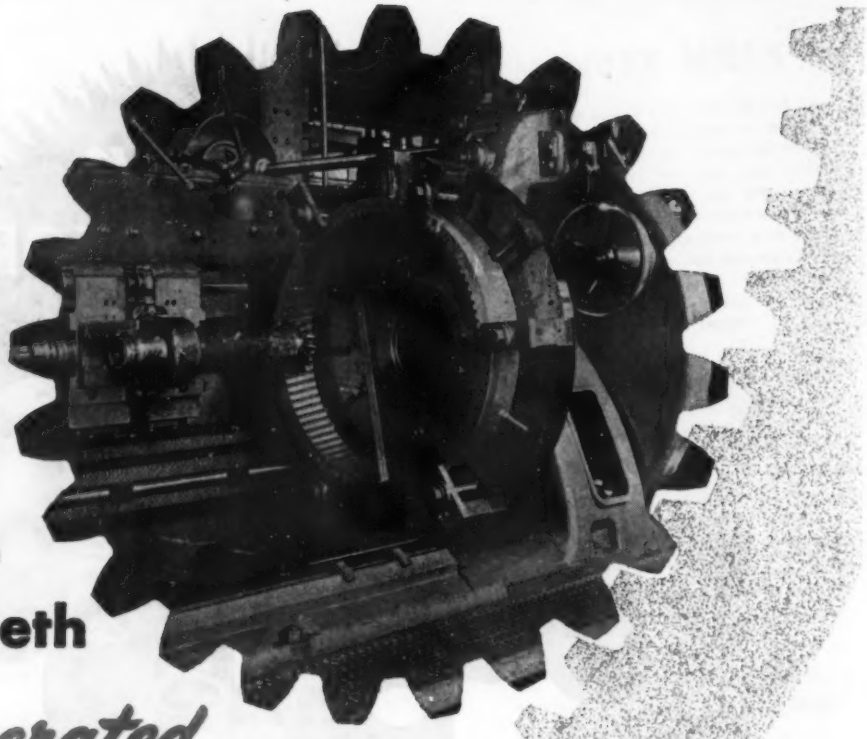
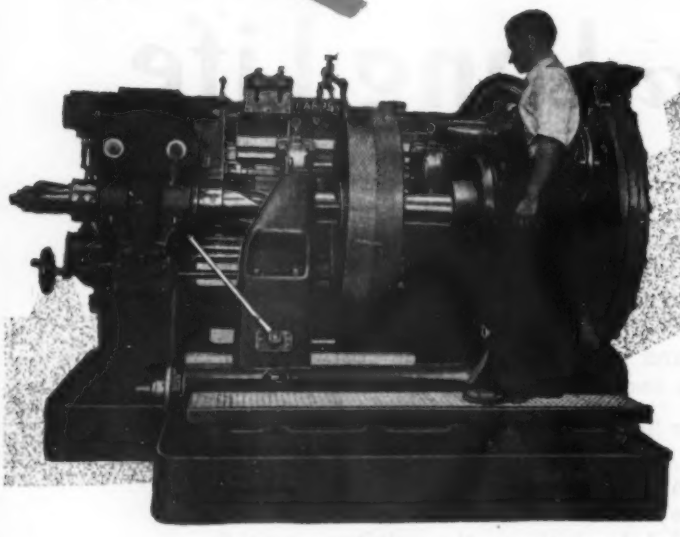
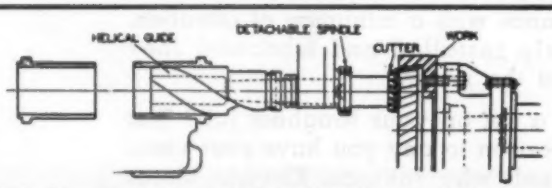


INTERNAL GEARS

with straight or single helical teeth

Precision Generated ~~CUT~~ BY THIS MACHINE





Method of generating internal single helical teeth. An internal spur gear is cut by using a straight grooved guide.

Internal gears are part of a wide range of gear products produced with uniform, high precision by the Farrel-Sykes Gear Generator. The gears can have either straight or single helical teeth. A typical set-up for generating an internal gear with helical teeth is shown in the illustrations.

Built with initial precision of the highest order, this machine is capable of turning out consistently precise work at a high rate for 30,000 hours (15 years of normal use) or more. Hardened, ground and lapped surfaces are used where wear could affect precision, and means are provided to compensate for unavoidable wear. Rapid reciprocation of cutters prevents temperature from affecting precision and permits extremely fine finishing cuts to be taken with facility and speed.

The gear manufacturer seeking accuracy of product, economy of operation, speed of production, or diversity of output will find the Farrel-Sykes Gear Generator an efficient machine tool of high earning capacity.

It is available in four sizes for producing gears in various size ranges from 0″ to 61″ in diameter. Write for complete details.

FARREL-BIRMINGHAM COMPANY, INC.

344 VULCAN ST. • BUFFALO, N. Y.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Pittsburgh, Akron, Los Angeles, Tulsa, Houston.

FARREL *Farrel-Birmingham*

This HYDRAULIC POWER UNIT CAN WORK FOR YOU IN A MULTITUDE OF APPLICATIONS!

. . . it is the LeMaire TWIN RAM which can be utilized in making your own special purpose machines for drilling, boring, reaming, etc.

Being self-contained, the TWIN RAM lends itself to an exceptionally wide range of applications, and its usefulness is not restricted—this feature means extra value. It can be mounted horizontally, vertically or at any angle, and be transferred from one base to another as requirements dictate.

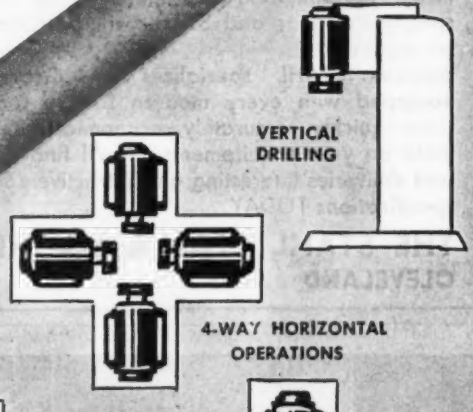
It can thus be one of your most valuable pieces of equipment.

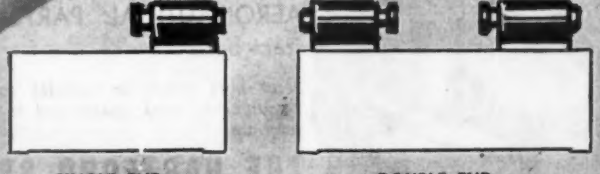
Uniform pressure behind the load is always in a straight line—the two rams prevent twisting action.

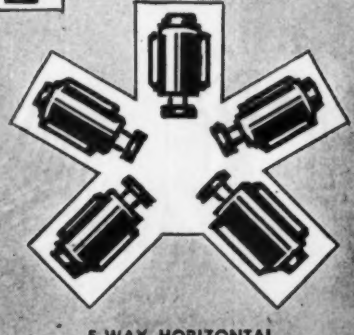
Send for new complete catalog.

LeMaire

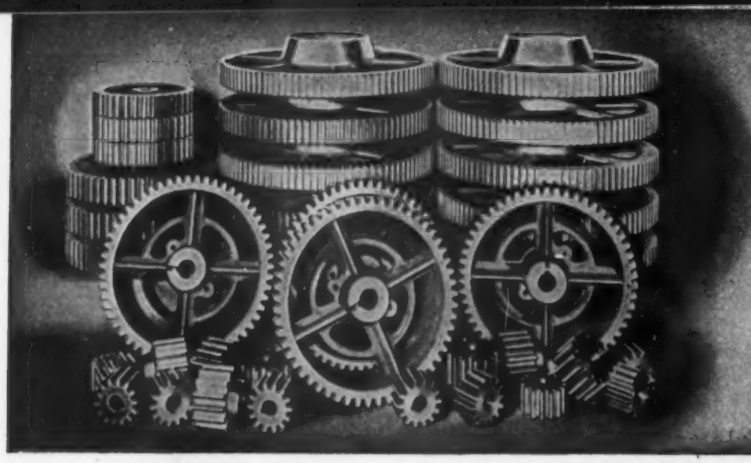
Builders of unit and way type machines for single or multiple spindle drilling, boring, reaming, tapping, etc. — twin ram hydraulic units — match-it gear chucks.







LeMAIRE TOOL & MFG. CO., 2657 So. Telegraph Rd., Dearborn, Mich.



ADAMS GEARS

SPUR — HELICAL — WORM
BEVEL — MITER — RACKS

Splined Shafts A Specialty

THE ADAMS COMPANY
Est. 1883
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. . . and STAHL PRODUCED IT exactly to specifications

Big gears, small gears—gears of all sizes, types and in any quantities—it's all the same to STAHL. You specify the gear and STAHL will produce it, exactly as required.

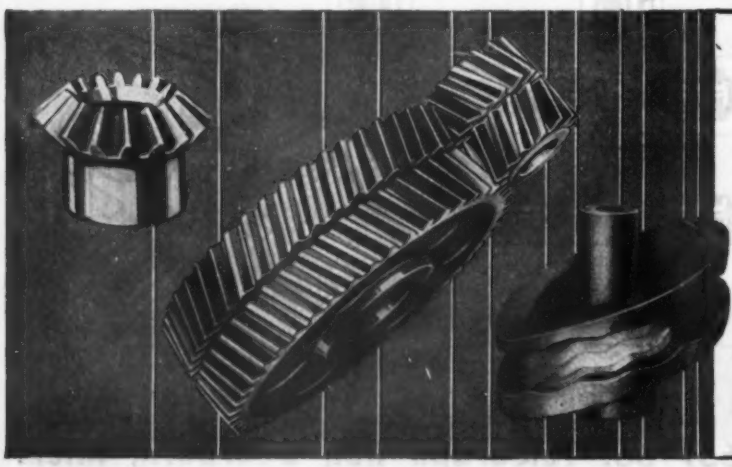
Because STAHL specializes on Gears, we are equipped with every modern facility for producing them—quickly, accurately, economically. Let us estimate on your requirements. You'll find STAHL prices and deliveries interesting and attractive. *Send us your specifications TODAY.*

THE STAHL GEAR & MACHINE CO.
CLEVELAND . . . OHIO

"When your specifications call for special gears — Spur — Bevel — Mitres — Helical — Worms and Worm Gears — Reduction Units — Why not try GRANT.

You will find GRANT service meeting all requirements of both stock and special gears."

GRANT GEAR WORKS
BOSTON, MASS.



GET YOUR QUOTATION *from* "HARTFORD"

GEARS of every description cut to order
GEAR, CAM and THREAD grinding
AERONAUTICAL PARTS on contract basis

Send blue prints or samples for estimate. Accuracy of work guaranteed to your specifications.

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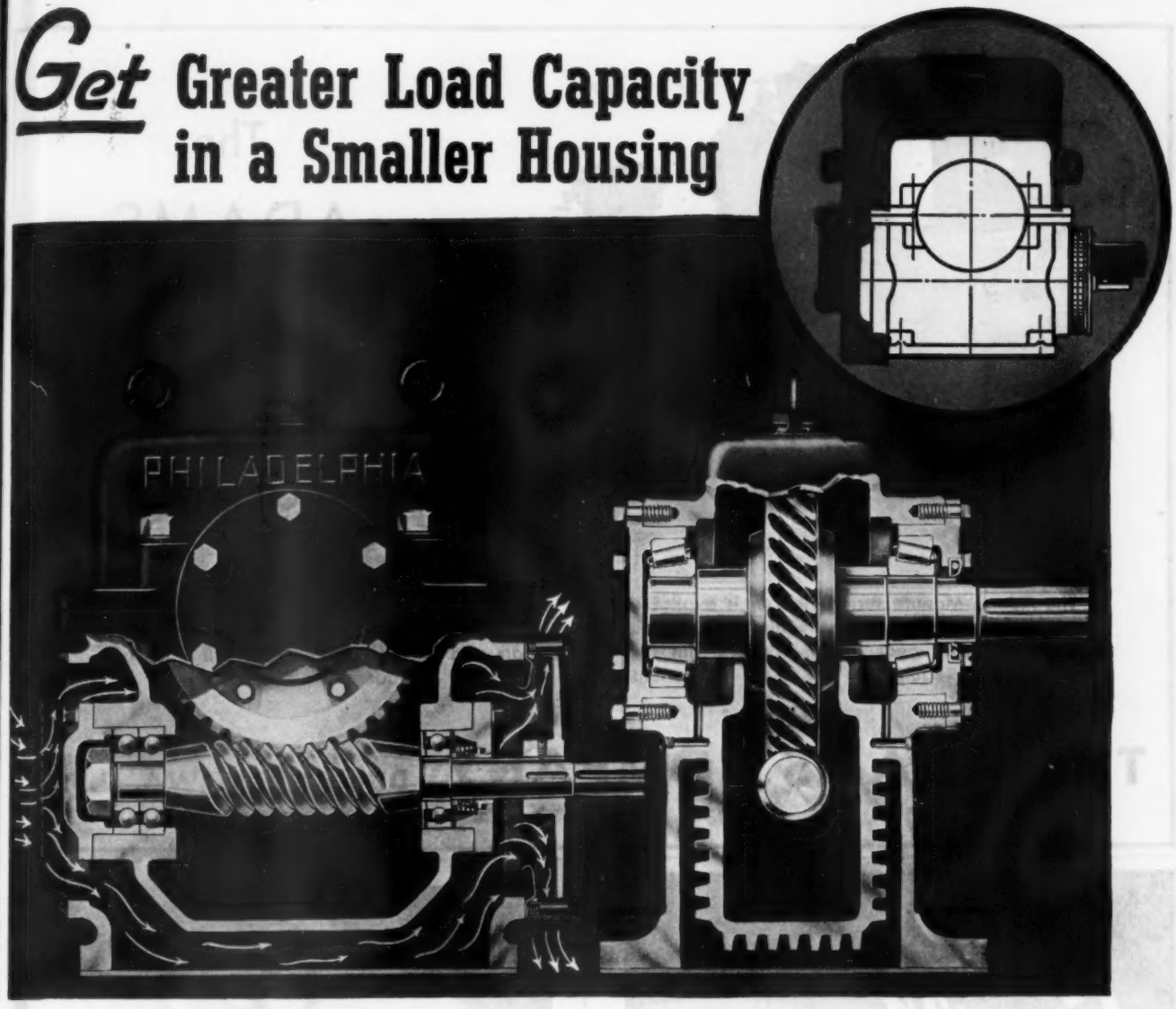
Get Greater Load Capacity in a Smaller Housing



...with the Philadelphia AIR KOOLED Worm Gear Speed Reducer

At the upper right is shown the comparative sizes of a size 675 Type AT standard unit (in blue) and a size 475 AirKooled unit. Both deliver 20 HP at 1750 RPM. Ratio 4 6/7 to 1.

The cut-away drawings show the double-walled, finned housing and the flow of air around the oil reservoir.

Considerable space and *weight* savings have been made possible by the design of Philadelphia AirKooled Worm Gear Reducers as compared with standard heavy duty type worm gear units.

The AirKooled design features a suction fan, mounted on the worm shaft, which draws air through the double-walled, finned housing. This dissipates generated heat, and thereby maintains a higher contact oil film strength and greatly increases the horsepower ratings at worm speeds of 580 and 1750 RPM. For all ratios at 1750 RPM the ratings are approximately doubled, so the AirKooled unit is about two sizes smaller than a standard unit of the same capacity.

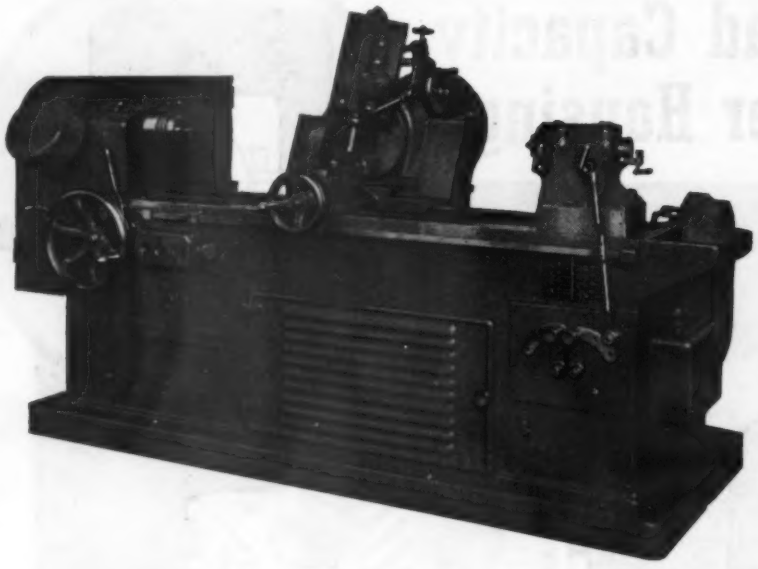
Let us tell you what these savings can mean to you.

SEND FOR BULLETIN 250 .... *on your Business Letterhead*

Philadelphia GEAR WORKS INCORPORATED

ERIE AVE. AND G ST., PHILADELPHIA 34, PA. NEW YORK • PITTSBURGH • CHICAGO

Industrial Gears and Speed Reducers
LimiTorque Valve Controls



The ADAMS Gear Hobber and Thread Miller

The Adams Manufacturing Hobber is available when there is a sufficient volume of splined shaft and spur gear hobbing to warrant the purchase of equipment for these operations only.

Here is a machine that combines precision with versatility. It hobs multiple splined shafts, spur gears and helical gears, and it will mill worm and screw threads.

THE ADAMS COMPANY

1905 BRIDGE STREET
DUBUQUE, IOWA, U.S.A.

1883 — Our 62nd Year — 1945

Large Gears

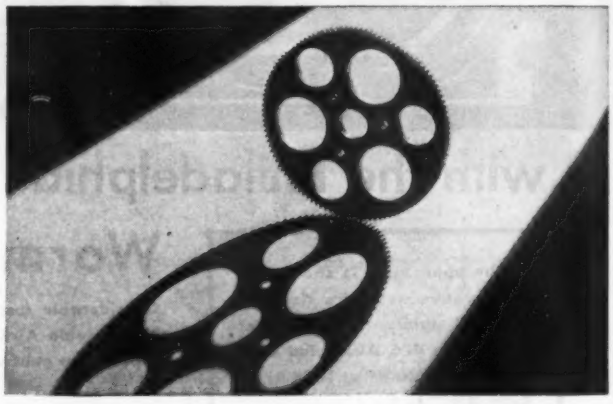
BEVEL GEARS UP TO 16″

SPUR GEARS UP TO 36″

ALL PITCHES

MADE FROM ANY MATERIAL
***Exactly* TO YOUR SPECIFICATIONS**

DETROIT *Bevel Gear* COMPANY
8130 103 CAMPAU AVE DETROIT 11, MICHIGAN



COMING EVENTS CAST THEIR SHADOWS—

Greater "know-how" in gear cutting methods has resulted in finer accuracy and finish without additional cost. As a result, gear teeth stand up longer and roll more quietly. These will be important factors in the gear design of your future products, making them more dependable and attractive.

Our services and experience will help you solve production problems on small or medium size spur, helical and rack gears, worms, splines, sprockets and ground threads. Write for quotation on your specifications. No obligation of course.

Beaver Gear Works Inc.

1025 PARMELE STREET, ROCKFORD, ILLINOIS

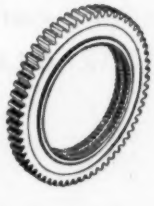
Custom Cut to *YOUR* specifications . .

PLUS!

A manufacturer who is in the market for gears takes for granted that any old-established gear producer will be capable of doing a job for him. His assumption is correct.

We freely concede that this organization does not have a monopoly of the country's gear engineering brains. However, in the manufacture of gears to customers' specifications there is a difference between a given number of finished gears that "get by" upon inspection and those that are "right on the button." This difference may not always be expressed in terms of gauge tolerances. Here at Perkins we like to believe that our men in the shop not only are *capable* of doing a good job but, in addition — like true craftsmen — have the *desire* to do it. *That* makes the difference. *Let us quote on Your Gear Requirements.*

PERKINS MAKES: Helical Gears, Bevel Gears, Ratchets, Worm Gears, Spiral Gears, Spur Gears, Ground Thread Worms



PERKINS MACHINE & GEAR CO.

SPRINGFIELD 2, MASSACHUSETTS

The bulletins shown are typical of the engineering service Falk renders to industry.

The Phrase FALK ... A GOOD NAME IN INDUSTRY *Possesses Tangible Values For You!*

The individual sale of a product is incidental. The service which that product renders is all-important . . . All-important to the buyer, because the continued satisfactory performance of that product confirms his judgment in purchasing it . . . All-important to the seller, because the satisfaction rendered the buyer enables the manufacturer to make sale after sale.

Falk products have been rendering a satisfactory service to industry for over 50 years. It is this satisfactory service that has enabled The Falk Corporation to continue, and to progress. It has enabled the buyer to depend on Falk claims for its products, and to depend on the performance to be secured from those products.

This is what we imply when we say: "Falk . . . a Good Name in Industry." That phrase includes the Falk philosophy of doing business, its policies, its research, its engineering skills, its production facilities, its service to industry, to its community, and to its employes. All this has given the Falk name a tangible value; and this tangible value has been meticulously maintained.

You who buy Falk products have acclaimed Falk a good name in industry. The fact that you were jointly responsible for this good name automatically provides you with values that would not otherwise be available.

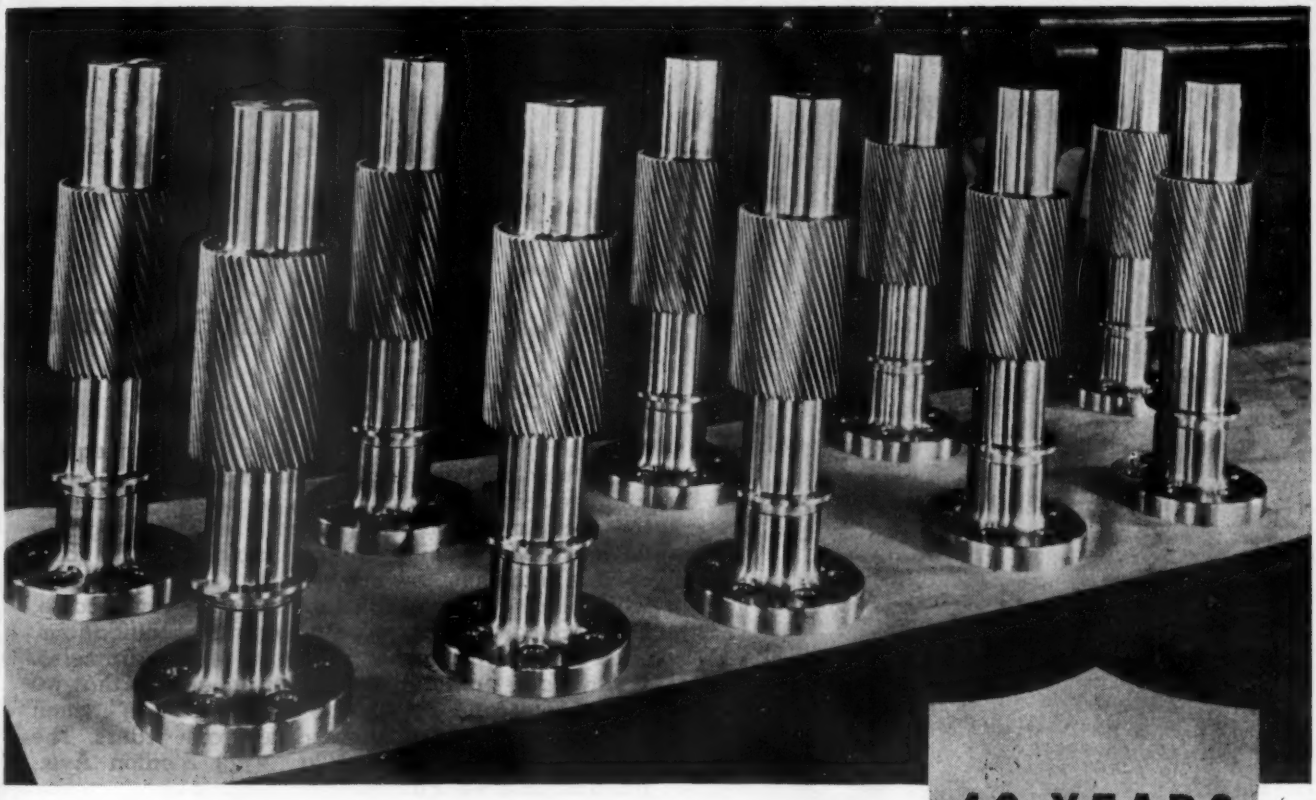
Therefore we say "Falk . . . a Good Name in Industry" possesses concrete value, and carries the assurance that "it always pays to consult Falk."

THE FALK CORPORATION, MILWAUKEE 8 WISCONSIN

IT ALWAYS PAYS TO CONSULT **FALK** . . . A GOOD NAME IN INDUST

For over fifty years Precision Manufacturers of
Speed Reducers • Motoreducers • Flexible Couplings • Herringbone and Single Helical Gears • Heavy Gear Drives
Marine and Diesel Engine Gear Drives and Clutches • Steel Castings • Contract Welding and Machine Work.

District offices, representatives, or distributors in principal cities.



40 YEARS EXPERIENCE ARE BACK OF SIER-BATH PRECISION GEARS *like these*

Ability to produce finely finished, close tolerance gears such as those shown here—and handle large orders promptly—will give some idea of the kind of service SIER-BATH is equipped to render.

Precision gears are SIER-BATH's specialty and are products of forty years of accumulated experience in the manufacture of gears exclusively. A completely equipped, modern plant, staffed by gear craftsmen and operated under rigid inspection methods, is SIER-BATH's contribution to demands for gears of highest quality and performance.

You are invited to submit your specifications for any type or quantity of gears from 2" to 52" diameter for a SIER-BATH quotation.

SIER-BATH GEAR CO.

9254 HUDSON BOULEVARD NORTH BERGEN, N. J.

Incorporated

The Doorway to 40 years experience in making Precision Gears

NOW is the time to re-design

● Industry is tired of the old and worn out equipment they have been using during the war years and are soon going to buy new equipment. To insure the acceptance for your products, start re-designing now. Plan to build sales-winning strength and service into them by using Earle Gears. Doing so will insure customer satisfaction for years to come. Earle Gears are custom-cut to your specifications, sizes range from inches up to 30 feet in diameter. Write today outlining your requirements so that we may quote; and be sure to specify "Earle" when drawing your plans and writing your orders. The Earle Gear & Machine Co., 4723 Stenton Ave., Philadelphia 44, Pa.

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SALES OFFICES:
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Pittsburgh 12, Pa.

You CAN TAKE IT FROM HERE

Get to know all of the various Cincinnati Gear Company services. Our many unique advances in gear manufacture and precision control can be used to your advantage.

You'll agree that the opportunities for product improvement with the versatility offered by the use of Cincinnati Gears are many and varied. Serving industry with their vital war needs is only one indication of the broad usefulness of Cincinnati *Gears, Good Gears Only.*

★ SPUR
★ BEVEL
★ HELICAL
★ SPLINE
★ WORM
★ SPECIAL

THE CINCINNATI GEAR COMPANY
"Gears Good Gears Only"
Wooster Pike and Marlemont Ave. ★ Cincinnati 27, Ohio

SMALL GEARS

SPURS ● HELICALS ● BEVELS
(Straight & Spiral)
WORM GEARING ● THREAD GRINDING
(14 to 96 D. P.)

As manufacturers of high precision small gears for numerous vital controls used in this highly mechanized war, we are literally 'swamped'.

Therefore, under existing conditions, we are forced to minimize further commitments unless they have W.P.B. urgency support.

Gear Specialties
MANUFACTURERS
CHICAGO

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LADDER CHAIN

Boston Gear Standard ladder chain and sprockets provide an economical means for transmitting mechanical power ranging from 1/50 to 1/5 horsepower at speeds up to 500 feet per minute and in numerous ratios made possible through a wide selection of sprocket sizes. Then too, many of these chains and sprockets are IN STOCK READY FOR YOUR IMMEDIATE USE. Any of the following authorized distributors and direct company branches will be pleased to give you complete specifications and prices of Boston Gear Standard ladder chain and sprockets.

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Most of the die set problems involved in the production of metal stampings and in tool and die-making can be solved by one or more of the hundreds of combinations which are available in standard Producto catalog sizes.

Producto can and will fill your requirements speedily; with its five strategically located assembly plants. **Your source of supply is the telephone on your desk.**

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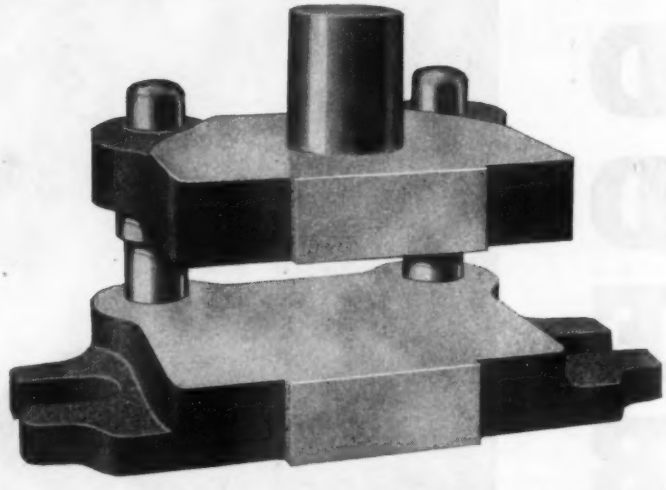
Producto Catalog No. 9 can help you save time and money. For speedy service, telephone nearest assembly plant.



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46 Styles—195,000 Sizes

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SWAGING MACHINE

— with 4000 forceful squeezing hammer blows per minute—makes metal tougher and more elastic. Send for booklet—"The Torrington Swaging Machine."

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and you're ready to make a NEW SIZE WASHER when you use...

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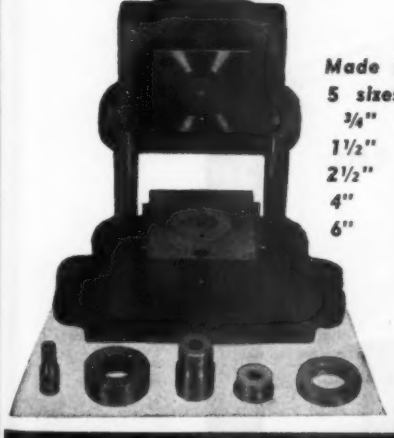
UNIVERSAL MASTER WASHER DIES



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Once having made a nominal investment in Hovis Master Washer Dies to fit your requirements, all you need is to change five small easily removable parts to make a new size washer. This takes only a few minutes. Think of what this means in the saving of time, materials, process engineering, tool designing and tool tryout! And you can make washers on short notice as you need them, avoiding large inventories. The Master Dies themselves do not become obsolete. USE THEM FOR PRESENT AND POSTWAR PRODUCTION.

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8098 E. NINE-MILE ROAD — **Suburb of Detroit** **Phone: Centerline 1575** — **VAN DYKE, MICHIGAN**

Straighten out production

with

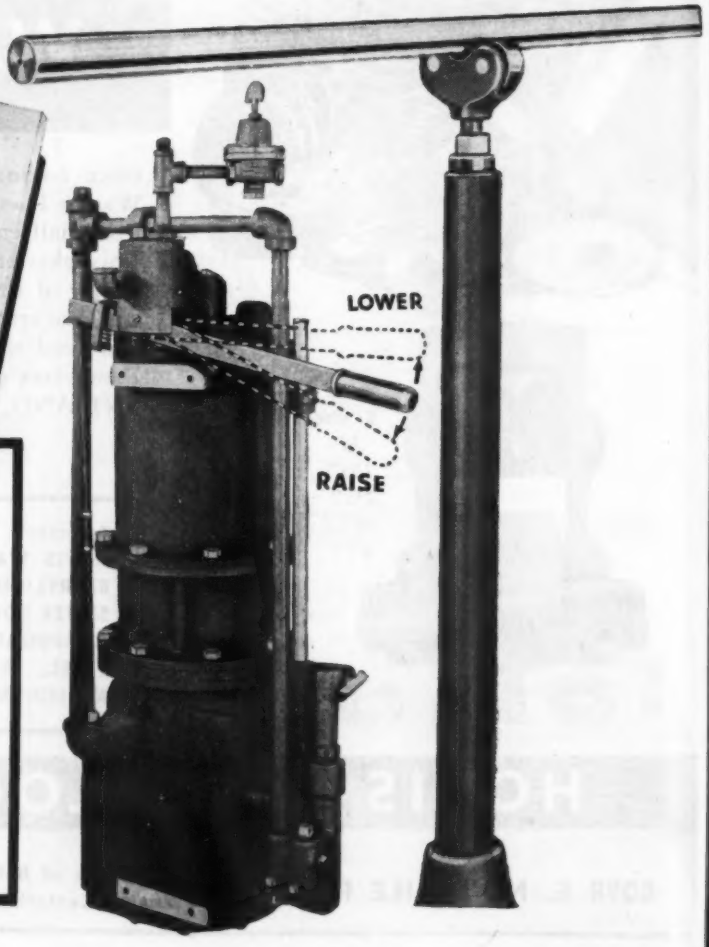
KRW HYDRAULIC PRESSES

Literally hundreds of adaptations of the standard KRW Hydraulic Arbor Press . . . in a great many industries . . . have definitely proven the many savings that accrue from the use of these highly versatile presses. In a great many cases, special KRW Presses have replaced heavier, outmoded equipment at a fraction of the cost.

Standard KRW Hydraulic Presses are made in 25, 50, 60 and 75-ton capacities. For special applications, these presses can be engineered to solve a specific problem . . . either hand operated, air-oil, electric-oil operation or in any combination. This equipment is so flexible that we have been able to design, build and ship special presses in a matter of weeks. Bring your special problems to us. We have the experience and facilities to give you *fast action.* Write for our Hydraulic Press Bulletin. K. R. Wilson, Dept. 11, 215 Main St., Buffalo 3, N. Y.

SEND FOR THIS 24-PAGE ILLUSTRATED HYDRAULIC PRESS CATALOG . . . full of valuable data!

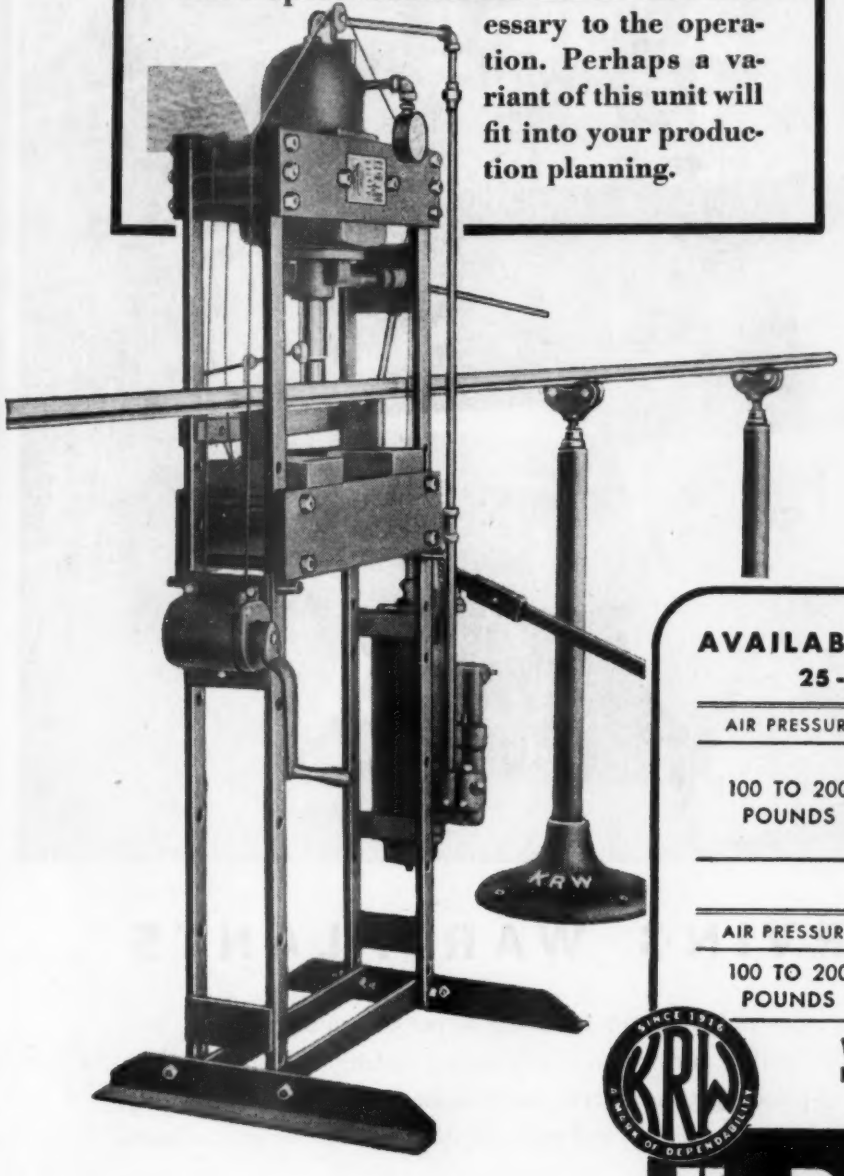
THE REASON WHY KRW PRESSES ARE FAST AND ACCURATE. The KRW Speedi-Booster eliminates the need for the conventional Capstan wheel or pumping lever. Instead, it uses compressed air as the motive power operating the ram. Because the compressed air is controllable through a pressure regulator, any desired tonnage pressure at the ram can be obtained and duplicated. Ram movement (up, down or stop) is instantly controlled with the slightest fingertip movement of the lever.

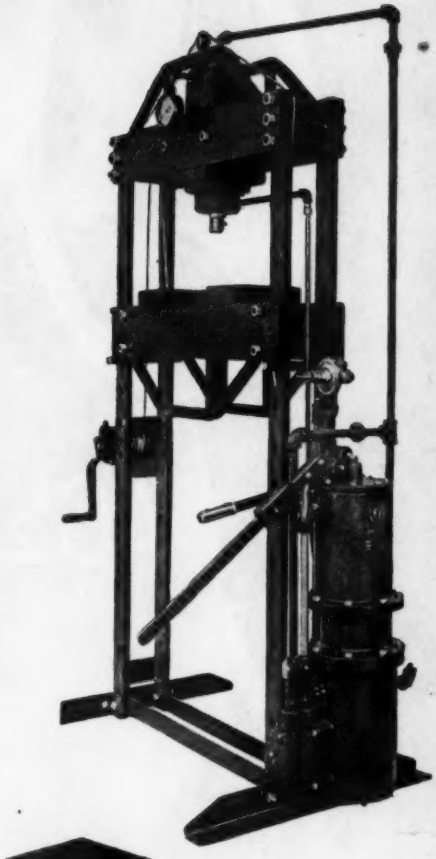


kinks... CUT COSTS

WAR-PROVEN ADVANTAGES OF LOW-COST KRW PRESSES ARE NOW BEING ADAPTED TO PEACETIME PRODUCTION SCHEDULES

This KRW Hydraulic Arbor Press was specially adapted for straightening propeller shafts of great length. On this particular unit a Speedi-Booster was not deemed necessary to the operation. Perhaps a variant of this unit will fit into your production planning.





75-ton KRW Press equipped with patented Speedi-Booster and Finger-tip control.

AVAILABLE TONNAGE PRESSURES

25-50-60 TON PRESSES

AIR PRESSURE	7" AIR CYLINDER		9" AIR CYLINDER	
100 TO 200 POUNDS	2" Oil Cylinder	1¾" Oil Cylinder	2" Oil Cylinder	1¾" Oil Cylinder
	10 to 22 Tons	14 to 29 Tons	17 to 35 Tons	23 to 47 Tons

75 TON PRESS

AIR PRESSURE	9" AIR CYLINDER	
100 TO 200 POUNDS	2" Oil Cylinder	1¾" Oil Cylinder
	25 to 51 Tons	33 to 68 Tons

Write Today for the KRW HYDRAULIC PRESS CATALOG

SINCE 1918 KRW A MARK OF DEPENDABILITY

K. R. WILSON

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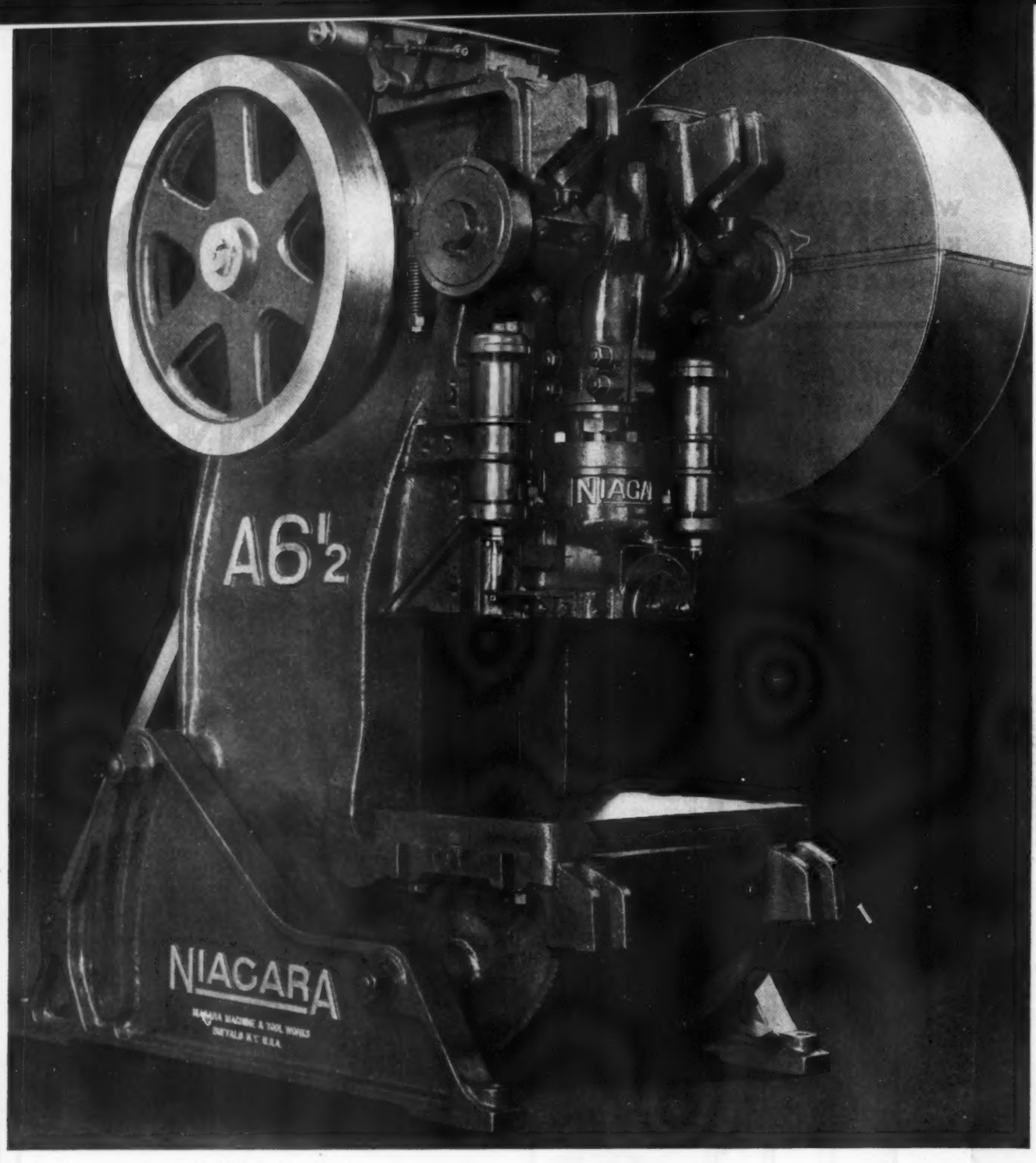

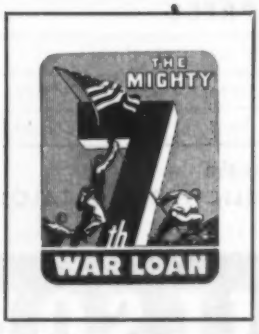

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Niagara Presses and Shears are increasing output of fighting material. Just one example of their many advanced engineering features is the instant-acting Niagara 14-point engagement sleeve clutch which increases both the efficiency of the press and the operator, and results in more production per man-hour.

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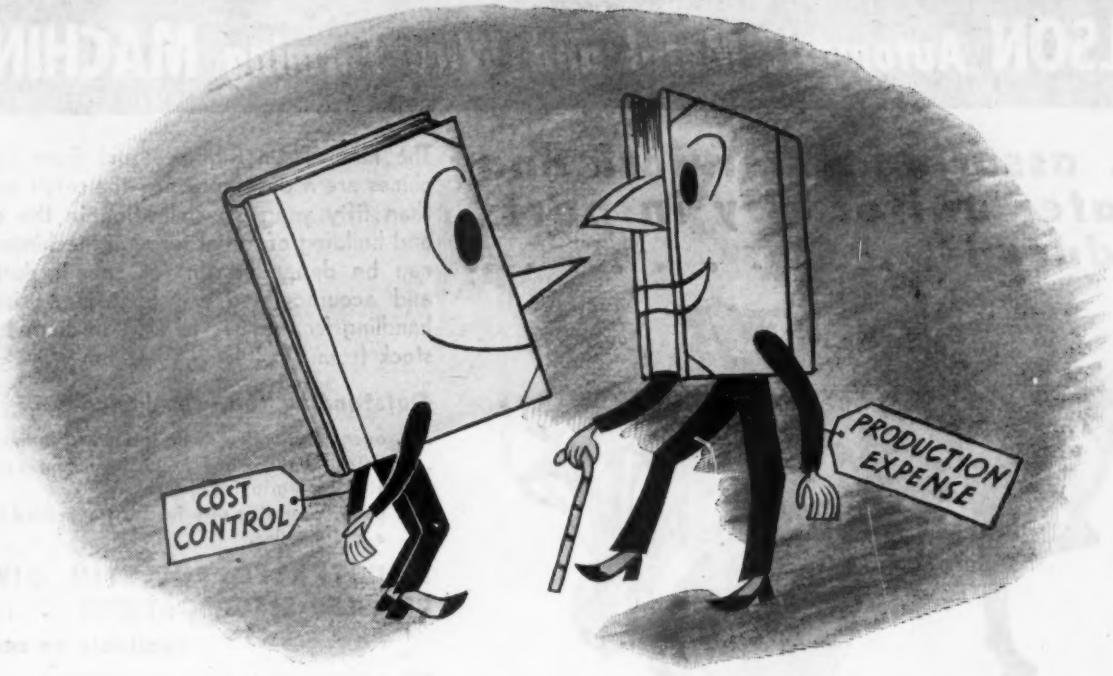

Cost Control . . .
"What's the Good Word?"

Production Expense . . .
"Masonite Die Stock Cuts Costs!"

C. C.—"That *is* a good word."

P. E.—"Right! Ever since we've been using Masonite* Die Stock, we've cut down on tooling-up time, made change-overs faster and saved a barrel of money."

C. C.—"Swell! How much of this material do you use?"

P. E.—"Puh-lenty! You'd be surprised to know how many dies, jigs, forms, assemblies and fixtures we've made with it. Another thing, it doesn't scratch the metal and we don't get a lot of inspection rejections. It has strength enough to turn out a lot of quantity, too!"

C. C.—"Haven't I seen some women handling those dies and jigs?"

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C. C.—"No wonder my boss is smiling these days!"

Masonite Die Stock, the smooth, grainless semi-plastic, is available in thicknesses of ¼ to 2 inches, in sizes 48 x 72 or 48 x 144 inches. It can be laminated to any thickness. For complete details, fill out and mail coupon below.

Look for the next issue of "PRODUCTION PIN-UPS" on your plants bulletin board. It gives you pictures and explanations of the latest uses of Masonite Die Stock.

*"Masonite" is a trade-mark registered in U. S. Pat. Off., and signifies that the Masonite Corporation is the source of the product.

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Please send me complete information about Masonite Die Stock.

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NILSON *Automatic Metal and Wire Forming* MACHINES

. . . assuring faster work and greater uniformity in parts produced . . . . . .

MODEL S-3-F

The new Nilson Ribbon Stock Forming Machines are a development—the result of more than fifty years specialization in the design and building of metal forming machines. They can be depended on for speed, durability and accuracy and are built in 4 sizes for handling from 3/32" to 1¼" in diameter and stock from 1¼" to 2½" wide.

Outstanding features include:

. . . open construction of the press and forming tools

. . . patented slide feed has independent cam-operated wire gripping device

. . . power operating wire feed is transmitted through a straight line.

ILLUSTRATED BULLETIN GIVING DETAILED SPECIFICATIONS . . . .

available on request

Nilson is prepared to design and produce special automatic machinery of high productive capacity. Our long experience in this class of work enables us to offer an expert and comprehensive service on special machines. Outline your problem—ask for our recommendations.

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"Ask ETNA about Swaging"

● If you have a production phase that calls for tapering, sizing or reducing of solids or tubes, you can save money if you "ASK ETNA ABOUT SWAGING." The superior performance of ETNA machines assures you more pieces per hour at lower cost. Built in capacities of ⅛" to 4" . . . larger sizes built to order!

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DANLY PRECISION DOWEL PINS

STANDARD AND .001 OVERSIZE

Hardened and Precision ground to a tolerance of ± .0001 of an inch. Available in .001 oversize for repair or renewal work.

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Talk About PRODUCTION Without DIES!

Send for Catalog . . . showing DI-ACRO Precision Machines and many examples of parts made with "DIE-LESS DUPLICATING".

← Pronounced "DIE-ACK-RO"

4,000 Parts Per Day With DI-ACRO Bender

Here is an example of "DIE-LESS DUPLICATING" typical of a great variety of formed parts readily made with DI-ACRO Precision Machines — Benders, Brakes, Shears. Picture shows the finished part formed to die precision, including acute right angle bend. Women operating DI-ACRO units maintain a high out-put on production work.

"Enclosed picture in our plant proves the DI-ACRO Bender will do a real production job. We are making 4,000 completed parts per day which is competitive to most Power Presses." (Name on request.)

DI-ACRO BENDER No. 1

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DI-ACRO PRECISION MACHINES LESS DUPLICATING

O'NEIL-IRWIN MFG. CO. 311 EIGHTH AVE. SOUTH • MINNEAPOLIS 15, MINN.

The deep curve of the lens gives over twice the impact resistance of regular safety lenses. Workers' eyes are safer.

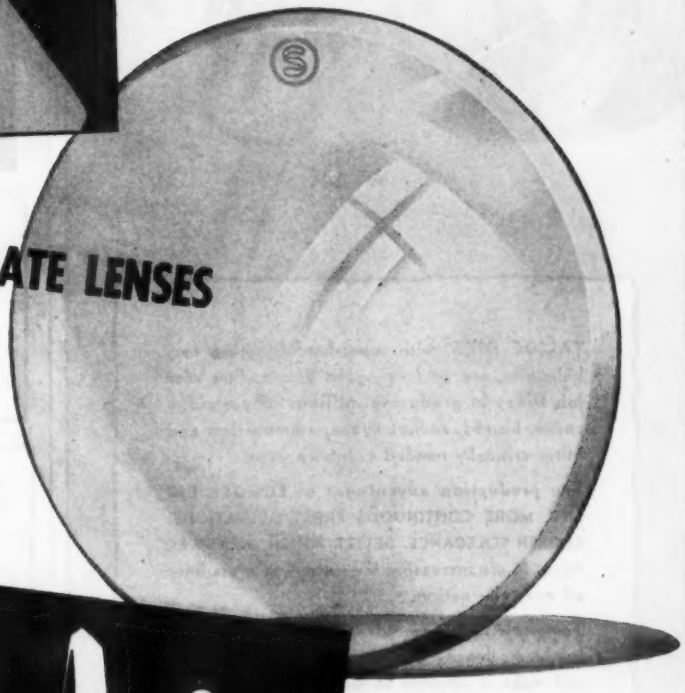
The curved shape of the lens permits closer fitting to the eyes for maximum protection, yet gives ample clearance for long lashes.

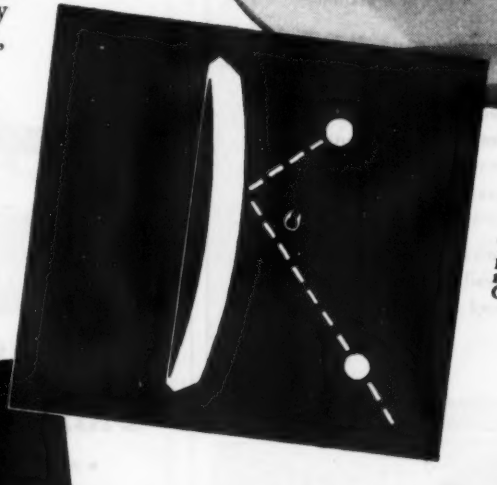
AO 6-CURVE SUPER ARMORPLATE LENSES

Save More Eyes...More Dollars

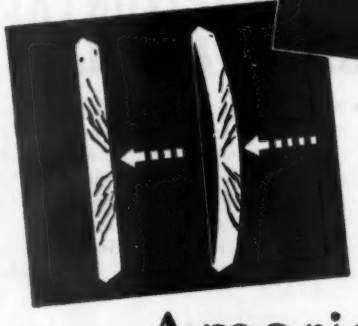
All your workers can enjoy the benefits of the lens that provides more than twice the resistance of regular protection lenses . . . the more certain deflection of flying particles . . . the tendency of the glass fragments to be wedged out and away from the eyes if the lens is fractured by an irresistible blow . . . the clear, normal, comfortable vision.

With all these advantages — your eye-protection costs will be lowered and company profits more secure. Remember — eyes are expensive targets — protect them with 6-Curve Super Armorplate lenses. Available in clear or calobar.





The curve of the lens aids in deflecting particles. Many blows that might fracture regular safety lenses are deflected by 6-Curve Super Armorplate Lens.



Glass fragments tend to be wedged away from the worker's eye if lens is fractured by an irresistible blow. Workers' eyes are safe.

American Optical

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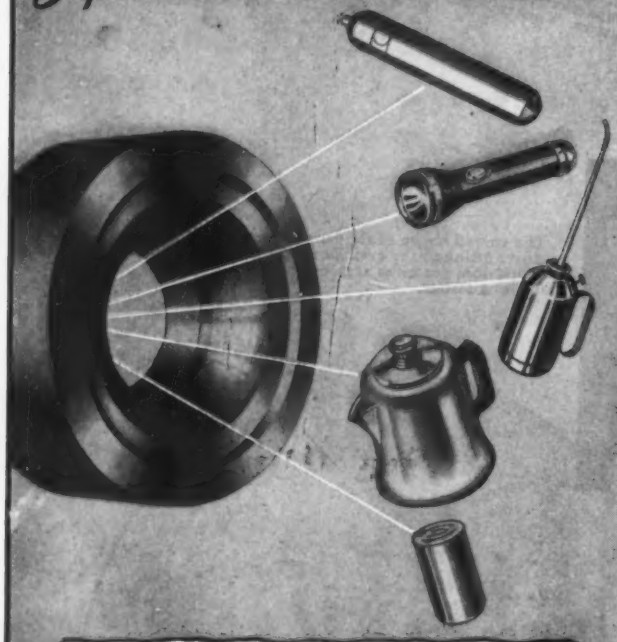
SOUTHBRIDGE, MASSACHUSETTS

DEEP DRAWN THROUGH··· *Super-hard* TALIDE DIES



TALIDE DIES, with super-hard tungsten carbide nibs, are performing an outstanding War job today in producing millions of cartridge cases, bombs, rocket tubes, ammunition and other critically needed ordnance items.

The production advantages of LONGER DIE LIFE, MORE CONTINUOUS PRESS OPERATIONS, CLOSER TOLERANCE, BETTER FINISH and FEWER REJECTS are increasing the output of press lines all over the nation.

Tomorrow . . . these advantages plus the extra hardness, density and toughness of Talide Dies will make it possible to mass produce at lower cost deep-drawn automotive parts, kitchen utensils, flashlight cases, cosmetic containers, food and beverage cans, high pressure gas tanks and a multitude of other peace-time products.

Talide Sheet-Metal Dies, made by our exclusive Hot Press Method, are available in hole sizes up to 24". Our experienced organization is at your disposal.

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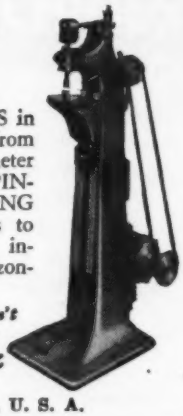
TUNGSTEN CARBIDE TOOLS — DIES — WEAR PARTS

GRANT

RIVETERS — PIONEERS in their line—head rivets from smallest to 5/8" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.



THE GRANT MFG. & MACHINE CO.
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FEEDS
AUTOMATIC EQUIPMENT
The V & O Press Company, Incorporated
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SMITH & MILLS
CRANK SHAPERS
sizes 12" to 32" stroke
THE SMITH & MILLS CO. **Cincinnati, Ohio**

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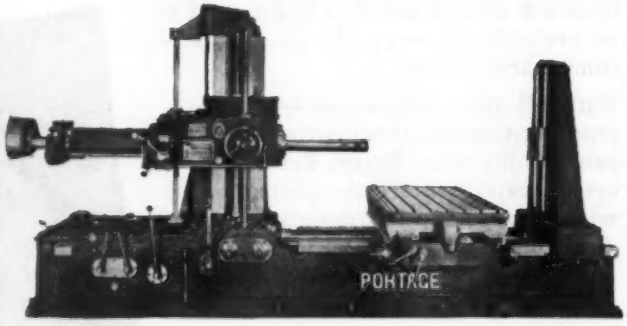

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• A ruggedly built machine capable of operation at maximum speeds and feeds to produce accurately finished work. . . . Machine furnished with coolant type table with either 36" x 60" working surface and 48" cross travel, or 48" x 72" working surface and 60" cross travel. . . . Extra height columns increase working capacity. . . . For greater speed—precision—high production specify PORTAGE.

WRITE for full descriptive bulletin today.

THE PORTAGE MACHINE CO.
AKRON 11, OHIO

Speaking of Manpower—

men do *more work* in less time if they have a *Wells No. 8—*

Today's production schedules and manpower shortage make it necessary to provide workmen with every possible means of saving time and labor . . . and that's where Wells No. 8 Metal Cutting Band Saws fit into the picture.

They can be used as auxiliary equipment to eliminate the bottleneck at big saws. They reduce time-wasting movement of stock—instead, you move a Portable Wells to the job. Set-up and change-over time are saved by their simple operation and quick acting vise. On production cut-off jobs one man can operate 2 or more Wells saws. There is a spot in *every* metal-working plant for a Wells No. 8.

SPECIFICATIONS
WELLS No. 8

CAPACITY:
Rectangular . . 8" x 16"
(Special Guides) 5" x 24"

ROUNDS: . . 8" diameter

MOTOR: ½ H.P., A.C. or D.C.

SPEEDS: . Selective 60, 90, 130 feet per minute.

WEIGHT: Approximately 750 pounds.

Wells SAWS
THE SIGN OF SERVICE

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
505 ROOSEVELT ROAD, THREE RIVERS, MICHIGAN

Longitudinal Feed — 20"
Cross Feed — 9"
Vertical Feed of Knee — 16"
Standard Table — 9" x 32"
Special Tables up to 48" available, also longitudinal power feed
Weight with Shaping Unit — 2000 lbs.

Change in job or operation means little to users of BRIDGEPORT TURRET MILLING MACHINES, because the versatility and utility of these fast, accurate machines make them adaptable to practically any work within their capacity. Ability of the BRIDGEPORT to mill, drill, bore and shape at all angles at one set up is an advantage which will greatly simplify the job of reconversion.

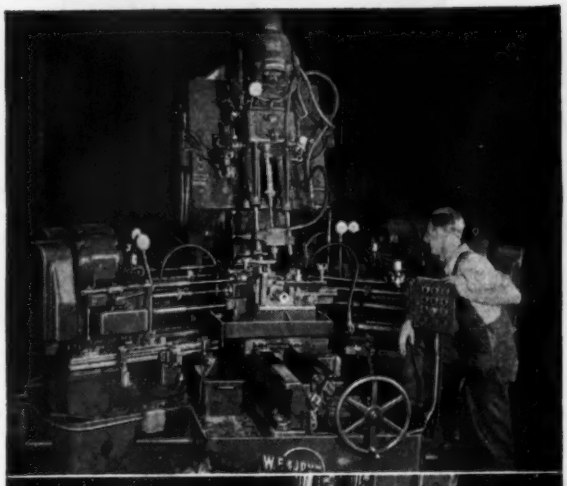
The Bridgeport MACHINES, Inc.
Bridgeport, Conn.

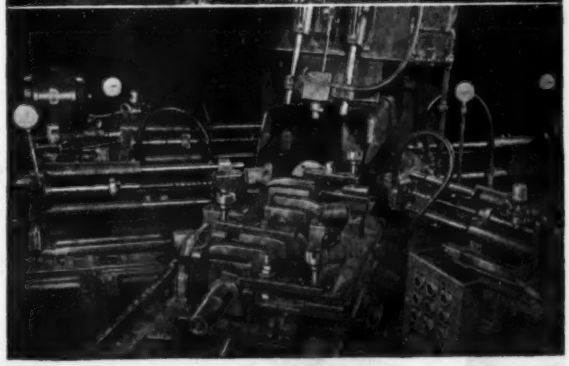
27 MINUTES PER PIECE SAVED IN DRILLING CRANKSHAFT OIL HOLES

The W. F. and John Barnes unit-type machine used in the simultaneous drilling of five oil holes, .382/.372" diameter, in diesel engine crankshafts, cuts production time by 27 minutes . . . and shows an increase of 308% in the number of pieces drilled per hour. A manual clamping fixture rigidly holds the piece, permitting all holes to be drilled at the same time.

Formerly, the conventional single spindle drill, handling each hole individually, consumed 40 minutes in performing these operations. It was necessary to shift the crankshaft for every hole.

Such high production increases are not unusual with Barnes unit-type machines. Engineered especially for this job, this Barnes machine, equipped with four horizontal hydraulic sliding head units, and one vertical angular hydraulic sliding head unit, guarantees rapidly drilled accurate holes at high production rates.





BARNES UNIT-TYPE MACHINE VERSATILITY EFFECTS SUBSTANTIAL SAVINGS

Production performance reports of Barnes unit-type machines show extraordinary savings in time and manpower; which savings more than justify the purchase of these machines. While specifically designed for "special" machining jobs today, Barnes unit-type machines, because of their unusual flexibility and versatility, are readily converted to other jobs on a production basis, with low cost. Only new fixtures and retooling are necessary.

If you have multiple machining jobs where high production precision drilling, tapping, boring, facing and milling operations are required, investigate the many superior advantages of Barnes unit-type machines. Barnes engineers solve unusual and special metal-working jobs. Their services are available, without obligation, of course.

SEND — for Bulletins No. 845 which describe the Barnes unit-type machines for various high production drilling, reaming, tapping, boring, facing and milling operations. These bulletins contain many suggestions to help you increase production at lower costs.

W. F. and JOHN BARNES

310 SOUTH WATER STREET • ROCKFORD, ILLINOIS, U.S.A.

The TOOL SUPERVISOR'S PROBLEM:

HOW TO ASSURE ACCURATE GRINDING OF SINGLE-POINT TOOLS

THE ANSWER!

THE OLIVER TEMPLATE TOOL BIT GRINDER

- ORIGINATED
- DEVELOPED
- PATENTED

by OLIVER OF ADRIAN
(Pat. No. 2,231,217)

This machine grinds Single-Point Tools with any combination of clearance angles and any reasonable shape or contour, with the assurance that every tool is an exact duplicate as to clearance and shape.

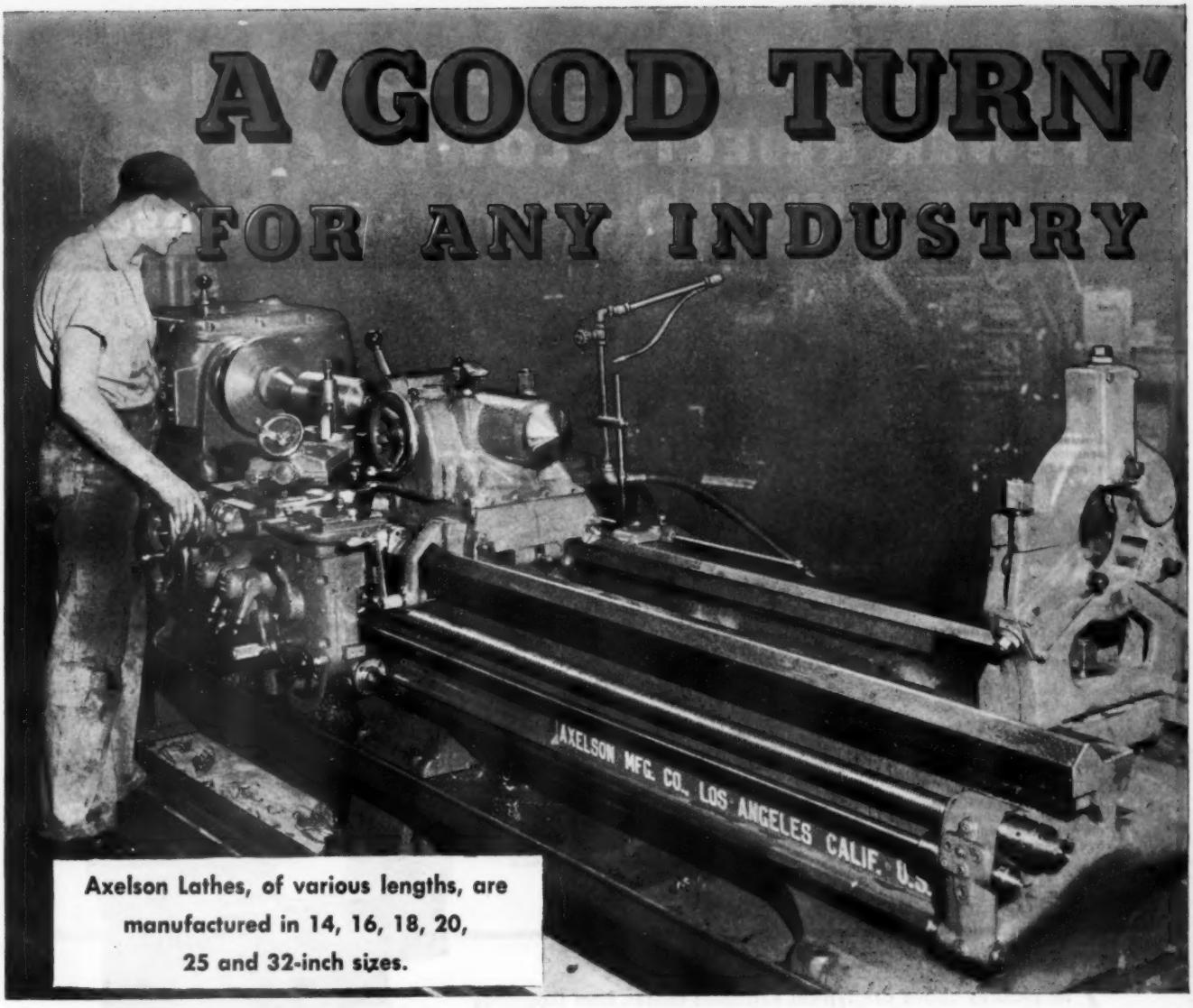
The machine is easily understood, and can be operated by a semi-skilled workman. Write for details! . . . OLIVER INSTRUMENT COMPANY, 1414 E. Maumee St., Adrian, Mich.

Don't Neglect Your Toolroom It's the Backbone of Production!

Oliver OF ADRIAN

AUTOMATIC DRILL GRINDERS — TOOL AND CUTTER GRINDERS — DRILL POINT THINNERS — TEMPLATE TOOL GRINDERS — FACE MILL GRINDERS — DIEMAKING MACHINES

A 'GOOD TURN' FOR ANY INDUSTRY



Axelson Lathes, of various lengths, are manufactured in 14, 16, 18, 20, 25 and 32-inch sizes.

OPERATORS of Axelson Heavy Duty Lathes reflect the sterling qualities of the machine itself. There is no anxiety about productivity as they put this machine tool through its paces. Axelson Lathes have been invested with thirty years of constant improvement, and today the machine is competent, "fool proof," versatile and economical to operate. . . . In the big job that lies ahead, as the Axis is driven from the world it sought to rule, reliable lathe work will be an all important feature of reconstruction. . . . Plants which have been "all out," in the battle of production, will have to be completely overhauled. . . . Lathe work will feature this kind of operation. . . . Vast mechanisms wrecked by war in Europe, will be restored by machine work done in the United States . . . Lathes will play a part in that, too. . . . And in the great new plans of reconversion, alert industrialists will depend on Axelson Heavy Duty Lathes for their metal turning as they did in production for war needs.

Write for Lathe Bulletin 4401 which describes the whole series of Axelson Lathes in detail . . . Lay your plans now for future Axelson Lathes, when added refinements can be offered you. . . . In the meantime rest assured that there is no better heavy duty lathe than the *Axelson*.

AXELSON MANUFACTURING CO.

6160 S. Boyle Ave. (Box 98, Vernon Station), Los Angeles 11, Calif.
50 Church St., New York City 7 • 3844 Walsh St., St. Louis, Mo.

AXELSON LATHES

Dependable for over a Quarter Century

BUY WAR BONDS!

Do you want GREATER PRODUCTION-FEWER REJECTS-LOWER COSTS-BETTER FINISH On Parts Like These?

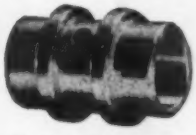
Stainless Steel Load Compensator Valve Seat. Hole is honed to .0002" limit.

Roller Bearing Outer Race. Finish improved from 12 micro-inches to 2 micro-inches.

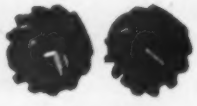
Inner Bearing Ring "Accurately removes last 'tenth' of stock."

Saved time in producing a smooth accurate finish on this bronze remote control valve body.

Cones for Wheel Balancing Machine "Accurately align hones two interrupted surfaces."



Hydraulic Two-Way Control Valve. Hole is honed to eliminate leakage.



Automobile Distributor Shaft Gears. Taper removed at a rate of 80-90 per hour.

Diesel Engine Fuel Injector Cylinder "So accurate that a piston can be fit within .00005 inch."

Aircraft Valve Guide. Valve tappet roller pin hole honed to 6 micro-inch finish.

Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.

Mild Steel Clevis. Honing corrected errors of previous operations and maintained true alignment of two holes.

Idle Valve Guide. Honing after grinding holds a .0002" limit necessary for accurate idling.

Aviation Hydraulic Cylinder made of Aluminum-Alloy. Improves the quality of the bearing surface. An extremely smooth surface-finish is secured.

The pictures above are typical examples chosen from thousands of parts now being successfully honed on the Sunnen Precision Honing Machine. This machine will handle any internal finishing job from .185" to 2.625", with an accuracy guaranteed to be within .0001". Accuracy has been held to within .000025" on production jobs. On many parts a super-smooth finish of from 2 to 3 micro-inches has been produced. Because of the ability to hold these close tolerances, rejects are held to a minimum, scrap is reduced.

Many of our customers have shown us where they have increased production as much as 200 to 300 percent over previous methods of finishing. Yet, this machine does not require skilled labor — you need no jigs nor fixtures — can be set up in one minute — and is economical to operate.

Find out how these advantages can be applied to the problems in your plant. A Sunnen engineer will be glad to call at your convenience — or write for a free descriptive bulletin.

SUNNEN PRODUCTS COMPANY
7941 Manchester Ave., St. Louis 17, Mo., *Canadian Factory: Chatham, Ont.*

The coveted Army-Navy "E" waves over the Sunnen plant — evidence of the important part Sunnen equipment is playing in the war effort.

SUNNEN HONING

· SPEED · ACCURACY · FINISH ·

It's GEMCO Shapers
for Continuous, Low-Cost Production!

High Production on Difficult Precision Aircraft Part
Solved by Special Jig Used on

GEMCO

Multi-Purpose SHAPERS

The small inset illustration above shows an aircraft part before and after machining. It is a forging made of high-carbon alloy steel, heat treated.

To accurately and economically machine this part in quantities was a real problem. A milling machine, with its very expensive cutter, was out of the question, because of the wide variance in the hardness of the material, which might easily ruin the cutter. Secondly, the peculiar shape of the parts meant that a fixture of unique design had to be made, to hold them.

The logical method of machining proved to be the GEMCO Shaper set-up shown in the larger photo. The fixture or special jig holds the parts perfectly. And the inexpensive tool bit in the toolpost of the shaper can be readily and inexpensively exchanged and sharpened.

Thus, this GEMCO Shaper set-up successfully answers the demand for continuous, accurate production at low cost.

The many distinctive features of GEMCO Multi-Purpose Shapers can definitely help YOU produce better products—more speedily, accurately, economically. Why not investigate GEMCO's possibilities?

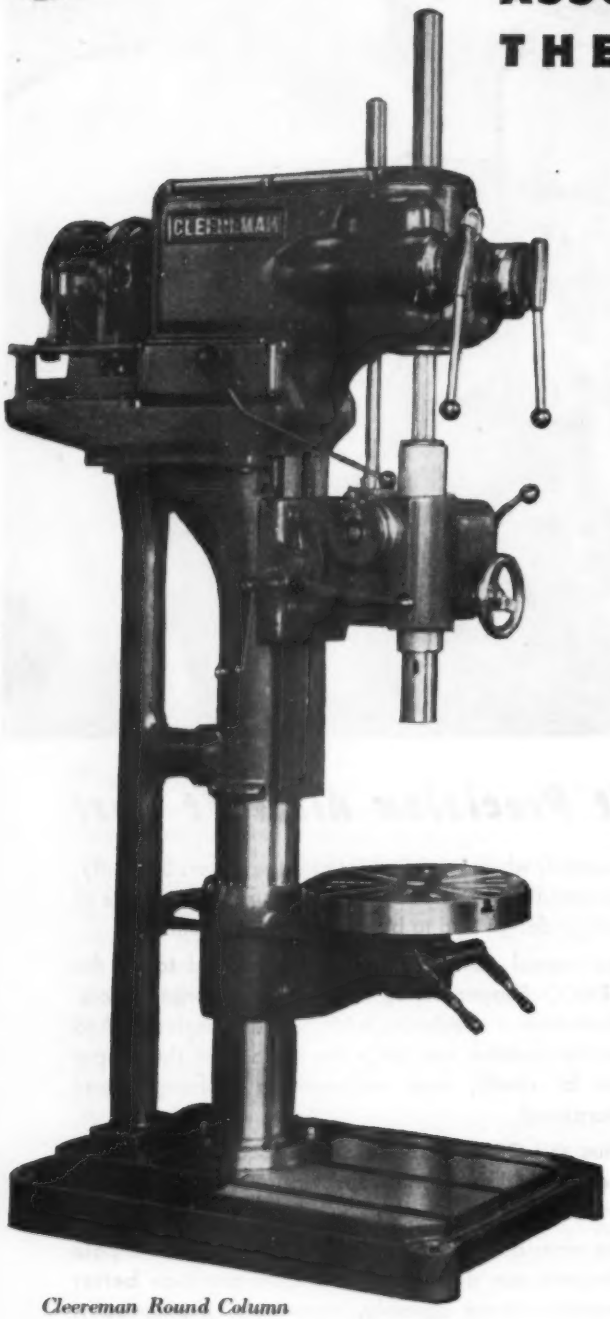
Write today for Bulletin GC-P2 A

GENERAL ENGINEERING & MFG. CO.

SAINT LOUIS 4, MISSOURI

Manufacturers of PRECISION MACHINERY Since 1917

Cleereman STAMINA ASSURES PROFIT LONG AFTER THE GUNS ARE SILENT



Cleereman Round Column Drilling Machine

Built into every Cleereman Drilling Machine is the Stamina to Work at High Speed and Retain Accuracy During Many Years of Use

Investment now in Cleereman Drilling Machines means many years of profit—profit that will be yours long after fighting ceases in Europe and in the Pacific.

Cleereman Machines are sturdily and finely built. Materials are selected to assure long life—parts are designed so that over-all machine accuracy will be maintained—skilled craftsmen and especially trained inspectors make certain that every manufacturing operation is fully up to the high standards set by Cleereman. When you select a Cleereman Drilling Machine you have chosen a machine tool that will operate at high speed throughout a long working life.

Cleereman Machine Tool Co. also builds Jig Borers of highest precision. Write for catalogs!

Address

BRYANT Machinery & Engineering Company

Associated with

CLEEREMAN MACHINE TOOL CO.

General Offices
400 West Madison Street
Chicago 6, Illinois

FEATURING

THE

Hendey

12-inch High Speed Motor Powered

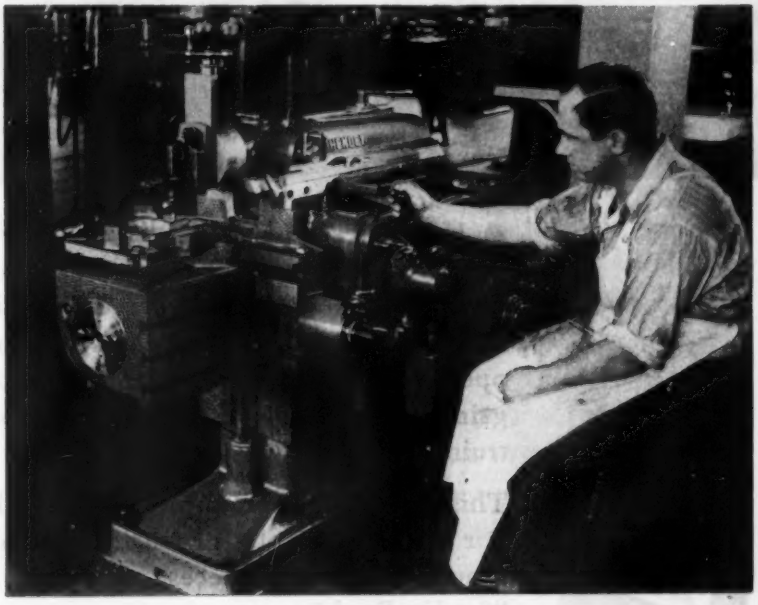
CRANK DRIVEN SHAPER

MECHANICAL DETAILS

Length of Ram	34"
Strokes per minute	14 to 200
Speed Changes	8
High speed on 6" stroke	182' per min.
Vertical travel of tool slide	4 3/8"
Power down feed range	.0025" to .030"
Size of tool opening	1 1/2 x 11/16"
Size of table top, plain surface	11" x 12 1/2"
Size of tilting top	10 x 12"
Top tilts either way	15°
Horizontal travel of table	17 5/8"
Vertical movement	14 1/4"
Power cross feed range	.0025" to .090"
Net weight with motor	approx. 2825 lb.

This shaper has automatic lubrication applied to the entire driving mechanism. Speed change gears run in an oil circulating bath in gear box. Crank gear, back gear and driving pinion are lubricated independently by oil flowing under positive circulation. Ram ways, crank pin and block and feed mechanism are efficiently oiled through a circulating system operated by pump with oil filtered on the return.

Main driving clutch has a start and stop lever either side of ram. This makes it possible for operator to control ram movement when working on either side of table.



Hendey 12" Crank Shaper in the tool room of a well-known manufacturer, where its ready adaptability to a wide range of work is known and appreciated.

1874 — 71 YEARS EMPLOYED IN THE CREATION OF MACHINE TOOLS DEMANDED BY CRITICAL USERS WHO HAVE ALWAYS WANTED THE BEST — 1945

THE HENDEY MACHINE CO.

TORRINGTON, CONN.

BOSTON NEW YORK ROCHESTER CHICAGO DETROIT

5100 lb. Foster FASTERMATIC Bed GROUND IN 5 HRS. ON MATTISON GRINDER

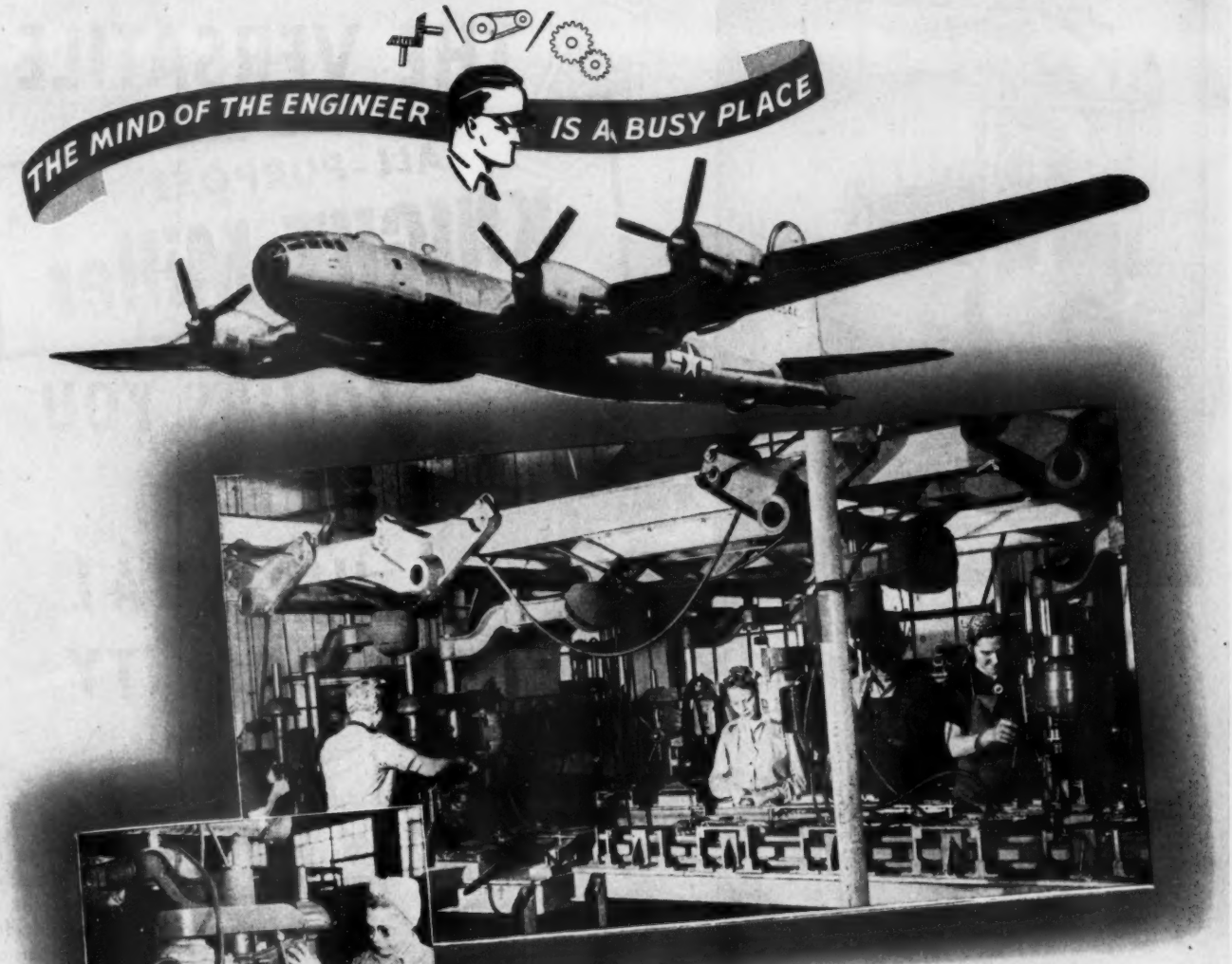
● Headstock and index plate surfaces and hardened nitrited ways (900 to 950 Brinnell) of Foster Fastermatic Beds are ground to close limits of accuracy on the Mattison High-Powered Precision Surface Grinder. The full length of the ways (over 100″) are held within an accuracy of one thousandth. Grinding operations on above mentioned surfaces are accomplished in five hours. For grinding the ways, wheels are dressed to correct angle by means of special truing device.

This is only one example showing the capability of the Mattison Grinder. For further examples of what this Grinder can do in handling large castings, a number of small pieces, or form grinding, send for free copy of Mattison "Set-Up Book".

● **ADDITIONAL INFORMATION** — Also available is a new bulletin, showing unusual jobs ground by means of special fixtures and dressing devices, as well as one on the Mattison Vertical Spindle Way Grinder. Send for a copy of each today.

MATTISON MACHINE WORKS

ROCKFORD · ILLINOIS



PLACE: Boeing Chehalis, Wash. Branch. PROBLEM: Improving accuracy, speeding production of B-29 "inboard wing compression ribs." SOLUTION: A huge jig for clamping various assembly members in place for boring rivet holes and Atlas drill presses in special counter-balanced swivel units suspended from steel beam track. Air-operated locating clamps and drilling plates insure extreme accuracy. Pressure is counter-balanced by huge weights (see photos). Drills are run 8,000 to 10,000 r.p.m. almost continually 16 hours a day—required virtually no service in first five months.

HIGH on the list of war production achievements is the ingenuity of American engineers in adapting compact precision machine tools to solve tough manufacturing problems.

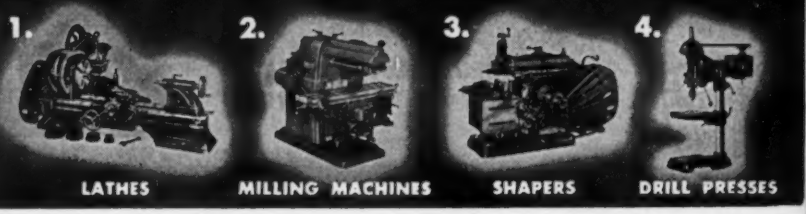
It took time for tool design experts to realize Atlas tools could "take" it. Once convinced, they have proceeded to come through with an amazing array of special adaptations, semi-automatic, and automatic machines for greater precision, greater production speed, and drastically lowered costs.

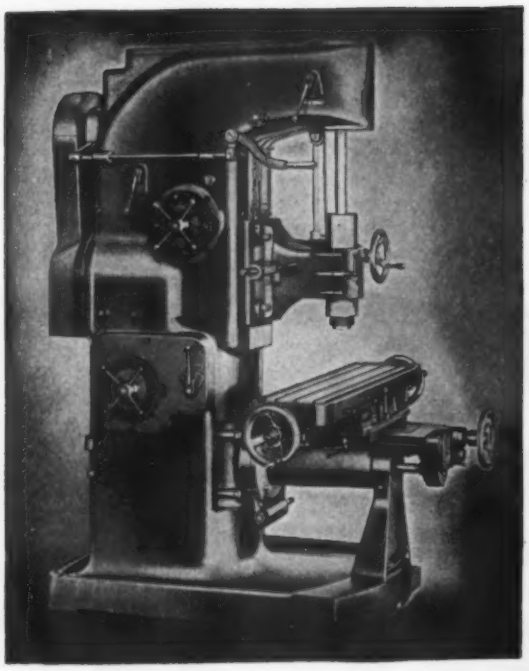
If you are retooling for new contracts, or bringing reconversion plans up to the production stage, keep in mind the proven precision and adaptability of Atlas tools. The latest catalogs will give you the specifications you need.

ATLAS PRESS COMPANY

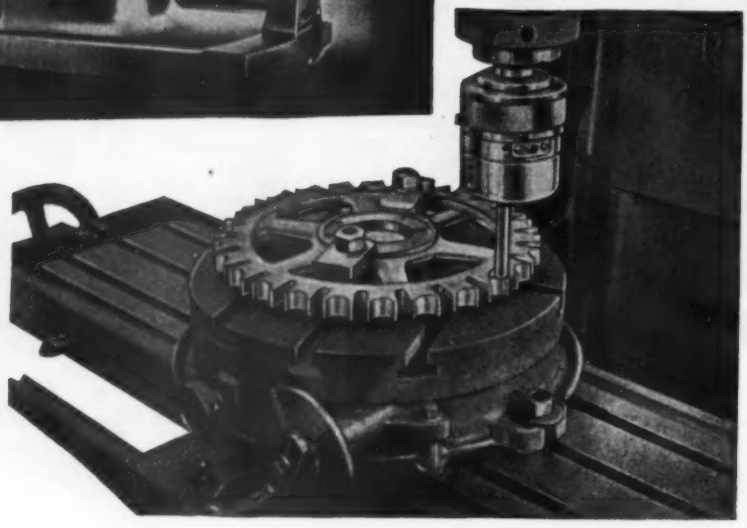
504 NORTH PITCHER STREET, KALAMAZOO 130, MICHIGAN

4 Atlas TOOL TEAM FOR SMALL-PARTS MACHINING





THE VERSATILE ALL-PURPOSE KNIGHT Miller EQUIPS YOU FOR UNUSUAL CAPACITY



You get that all important "ACCURACY"

The geneva cam in this picture illustrates a typical job requiring accurate milling, boring, and spacing. The slots between the cam tracks held to be the same width and depth, the cam tracks all the same radius, and the spacing from center to center of each exactly the same. This was done quickly as well as accurately on a KNIGHT Miller equipped with indexing rotary table.

- ★ Speed and Accuracy for light milling
- ★ Power and Rigidity for heavy cuts
- ★ Difficult and Unusual Parts handled quickly and accurately without special equipment
- ★ Limited and Special Production done economically and quality maintained without special tooling
- ★ Internal and External Milling done at one setting

● The KNIGHT Miller's wide range of spindle feeds, solid table unit, ease of handling combine with other features to give you unusual capacity whether for light milling, heavy milling, or precision boring.

These milling machines will perform and produce at any of their speeds and feeds to the full capacity of the motor installed.

Capacity too is realized because of the short time necessary for making setups even though they are difficult ones. Additional setups in most cases are eliminated — some are greatly simplified.

There is quick and accurate location of holes and surfaces—particularly so when dial indicators are used. To change vertical settings you simply move the spindle rather than the work. Added to all this is the fast method of changing cutting tools.

To get the full story on the fast, compact, complete, and convenient-to-handle KNIGHT Miller, write for catalog.

KNIGHT VERSATILE MILLERS ACCURATE - RIGID

IMMEDIATE DELIVERY SUBJECT TO PRIOR ORDER

W. B. KNIGHT MACHINERY CO.
• ST. LOUIS, MISSOURI •

NATCO HOLEWAY MACHINE

FOR PROCESSING 84 OPERATIONS ON BOTH SIDES AND TOP OF TRACTOR CYLINDER BLOCKS

A tractor cylinder block is automatically conveyed from station to station through this NATCO HOLEWAY machine. Actually the machine carries eight blocks while operations are being performed simultaneously upon four of them. The holes vary from 5/16" to 1" in diameter and from ⅛" to 8¼" in depth.

The machine consists of four horizontal HOLEUNITS, one vertical angular HOLEUNIT, and one vertical HOLESTEEL unit mounted integrally with the seven-position straight-line indexing fixture. It is an example of the many NATCO HOLEWAY machines illustrated in our literature which is yours for the asking.

Each NATCO machine is usually built of standard units to do a specific job. In most cases, the machines are capable of rearrangement to accommodate a change in the design of the work piece.

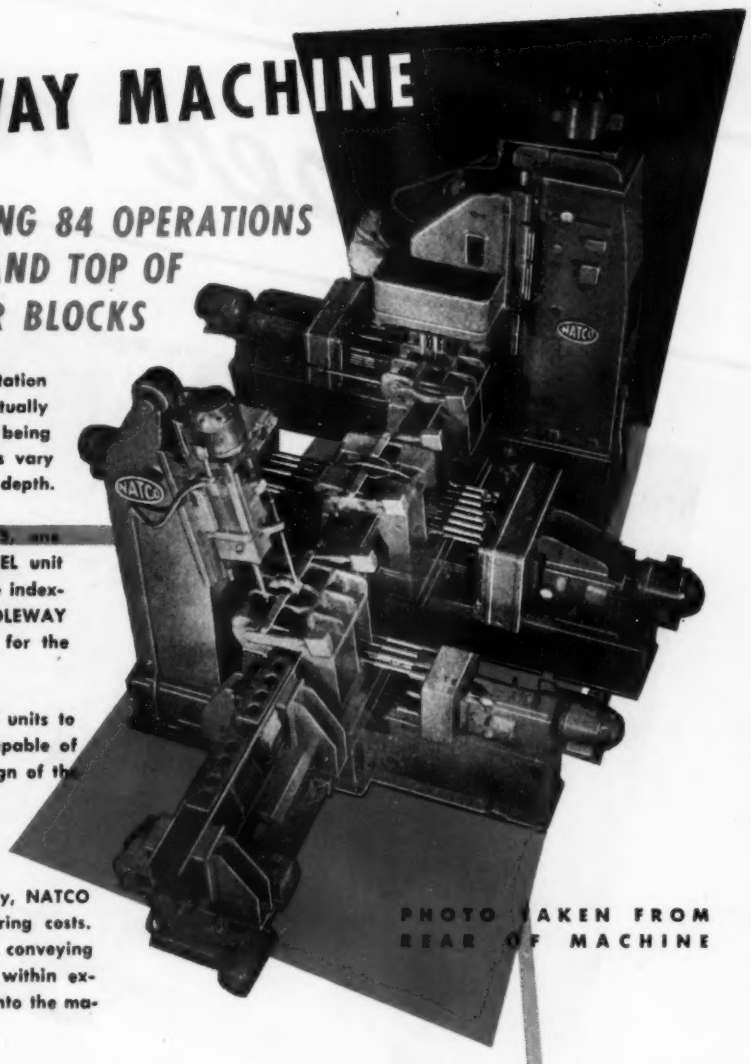


PHOTO TAKEN FROM REAR OF MACHINE

SPEED, ECONOMY, PRECISION

By processing a multiplicity of holes automatically, NATCO machines speed production and reduce manufacturing costs. They effect substantial savings in power, floor space, conveying equipment, and rehandling. They assure accuracy within extremely close tolerances because "the skill is built into the machine."

You are invited to send us your blueprints or have our field engineers make a survey of your requirements.

All of the holes in the top and both sides of the cylinder block are processed on the illustrated HOLEWAY machine. One block is loaded in each cycle and the following operations are completed:

POSITION 1—Operator loads one block.

POSITION 2—Right-hand horizontal unit drills 9 holes in valve side of block.
Front half of vertical unit drills 23 holes in top of block.

POSITION 3—Rear half of vertical unit counterbores 16 holes in top.

POSITION 5—Right-hand horizontal unit drills 10 holes and reams 1 in valve side.
Left-hand horizontal unit drills 17 holes in water side.

POSITION 7—Right-hand vertical angular unit combination drills and counterbores oil pump hole in water side.
Left-hand horizontal unit drills 5 holes and reams 2 in valve side.

POSITIONS 4 and 6 are idle to facilitate access to cutting tools and maintenance.

All operations are automatic from a push-button start.

Production, 30 blocks per hour.

National Automatic Tool Company, Inc., Richmond, Ind.

MULTIPLE DRILLING, BORING, AND TAPPING MACHINES

INVESTIGATE NATCO METHODS FOR THE LOWEST POSSIBLE HOLE COSTS!

SALES OFFICES: 1809 ENGINEERING BUILDING, CHICAGO; 409 NEW CENTER BUILDING, DETROIT; 1807 ELMWOOD AVENUE, BUFFALO; 2902 COMMERCE BUILDING, NEW YORK CITY

25 per minute!

High Production

with this
SEMI-AUTOMATIC
GARDNER
GRINDER

WHEN you need high production on flat surface parts of moderate size, this Gardner No. 122-20" Semi-automatic Grinder often provides the ideal answer to your problem.

For example, the shell parts seen above, are ground in this machine on a 15-station rotary carrier, at the rate of 20 TO 25 PIECES PER MINUTE. Parts are clamped and unclamped automatically, loaded by hand, but unloaded by gravity. Stock removal runs .005" to .008", and tolerances are .002" for parallelism, and .004" for size, or uniformity.

ASK FOR YOUR COPY OF OUR BULLETIN-"*Gardner Flat Surface Grinders*"

GARDNER MACHINE COMPANY
410 East Gardner Street • • • • Beloit, Wisconsin, U.S.A.

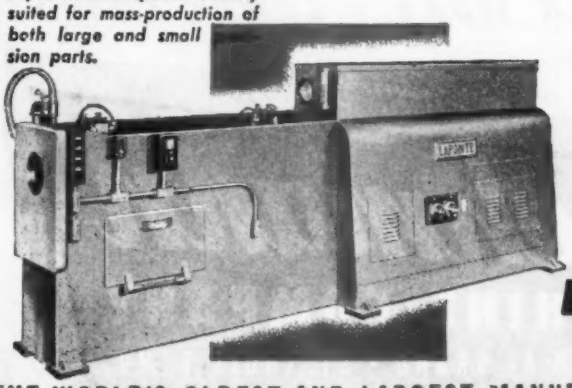
NEW BROOM . . .

"Nature abhors a vacuum," declared an ancient savant, but he never saw the plans for one of the new super-duper vacuum cleaners, whose ease and efficiency of operation will delight the housewives of America after victory. Women, manufacturers, and even we of Lapointe must perforce disagree with that outmoded saw, in our common search for the *perfect* vacuum.

A progressive manufacturer of vacuum cleaners recently brought his production problems to Lapointe for a constructive analysis of how great a part broaching could profitably play in his postwar production. His was no Buck Rogers' dream — he knew his cleaner would perform the same old chore, over the same old rugs — but he wanted it to do this job more efficiently, with less cost to the buyer . . . and more profit for himself.

That's where we came in. For nearly half a century Lapointe designed broaches and broaching machines have helped keep our customers' products well ahead of competition by producing an almost unlimited variety of precision parts quicker, cheaper . . . and better! Why not consult us today, to insure that your product will *also* make a "clean sweep" of the postwar market.

• IF YOU PLAN FOR TOMORROW • • CONSULT LAPOINTE TODAY •



HP-100 with 50 ton capacity, 76" stroke and patented rapid return speed. Ideally suited for mass-production of both large and small sion parts.

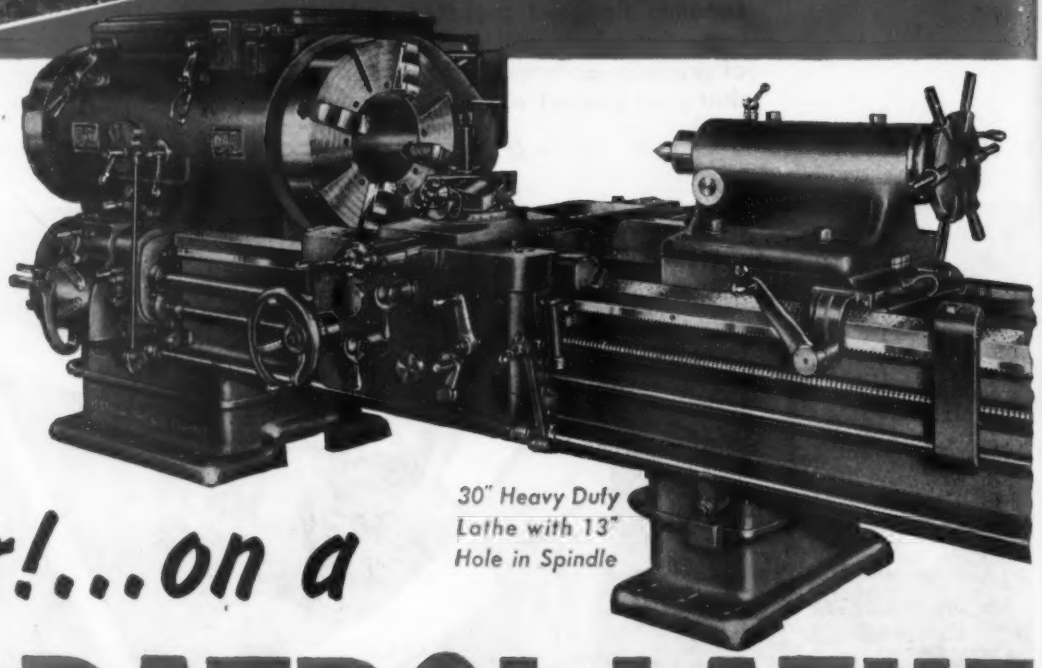
THE Lapointe

MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U S A

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES

"It Looks Like We'd Do It Better on a Hydratrol Lathe!"



30" Heavy Duty Lathe with 13" Hole in Spindle

Do It Better!...on a HYDRATROL LATHE

Large Hollow Spindle Type

Look around your own shop—you may find a number of machining jobs which possibly could be done better on Large Hollow Spindle Type of HYDRATROL LATHE. Send us prints of these difficult or too-costly jobs, for a specific, time-and-money-saving recommendation.

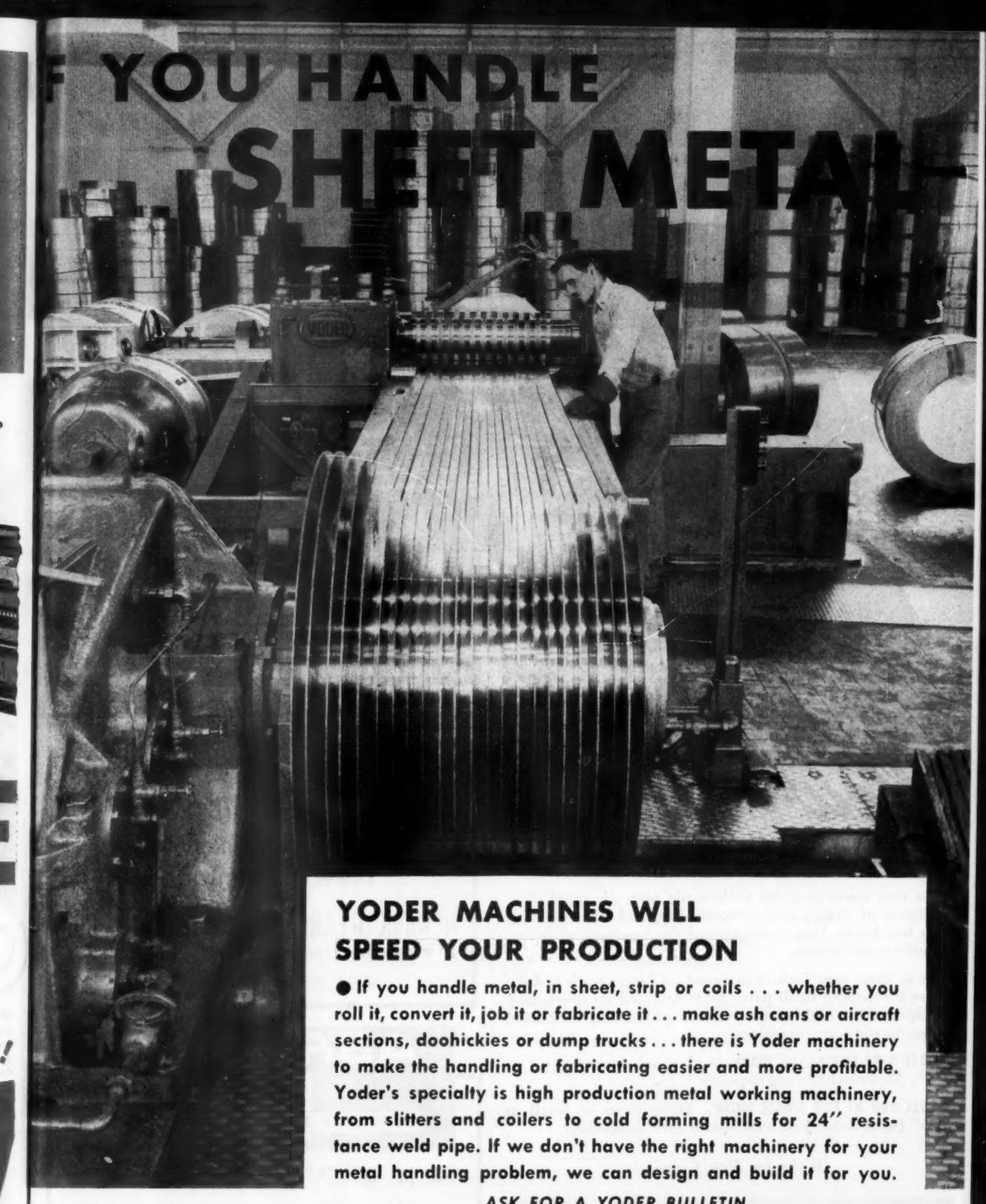
FOR FASTER PRODUCTION • BETTER WORK • LOWER COSTS!

5 SIZES — 18" to 36"

Small	18" up to 7¼"	Hole
Medium	24" up to 12"	Hole
Large	27" up to 13"	Hole
Large	30" up to 14"	Hole
Large	36" up to 16½"	Hole

(Standard type lathes, 16" to 36")

Lehmann
MACHINE COMPANY
CHOUTEAU AT GRAND • ST. LOUIS 3, MO.



YODER MACHINES WILL SPEED YOUR PRODUCTION

● If you handle metal, in sheet, strip or coils . . . whether you roll it, convert it, job it or fabricate it . . . make ash cans or aircraft sections, doohickies or dump trucks . . . there is Yoder machinery to make the handling or fabricating easier and more profitable. Yoder's specialty is high production metal working machinery, from slitters and coilers to cold forming mills for 24" resistance weld pipe. If we don't have the right machinery for your metal handling problem, we can design and build it for you.

ASK FOR A YODER BULLETIN

THE YODER COMPANY

METAL • WORKING • PRODUCTION • MACHINERY • 5514 Walworth Avenue, Cleveland 2, Ohio, U. S. A

ENGINEERING YODER MANUFACTURING

New BOYAR-SCHULTZ SCREW MACHINE TOOLS

Two new screw machine tools made with the usual thoroughness of design and workmanship, and fine materials that has for so long characterized the products of Boyar-Schultz manufacture.

One of these new Tools is designed for larger work and the other for turning small parts. Both designed for quick, easy set-up and for high speed precision production with hand or automatic screw machines.

MODEL 3 RT FOR LARGE WORK. With shank diameter 1¼" or 1½". Maximum turning capacity 1¼".

MODEL 000 RT FOR SMALL WORK. Turns parts as small as .075" (with rollers) or .020" (with carbide blocks).

Write for New Circulars

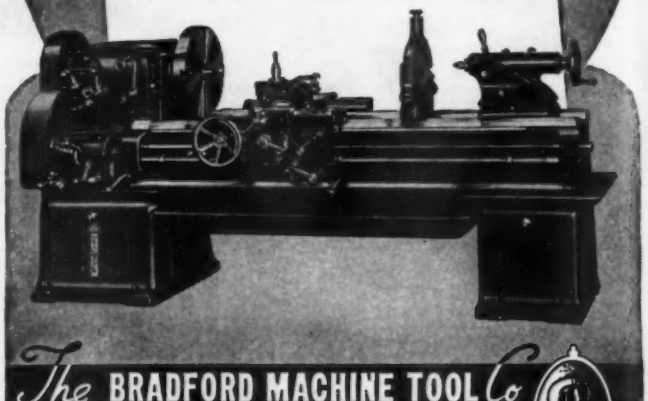
BOYAR-SCHULTZ CORPORATION
2110 Walnut Street CHICAGO 12

Metalmaster

12", 14" & 16" LATHES

Offer: Infinite range of threads and feeds. Easy gear adjustment. Independent motor mounting. Short, direct drive. One control for all threads. Ample power for heaviest cuts. Automatic stop for feeds.

Catalogs sent on request. Write for yours!



The **BRADFORD MACHINE TOOL Co**

MANUFACTURERS OF METAL WORKING LATHES; CAM FEED DRILLING AND TAPPING EQUIPMENT. HYDRAULIC DRILLING MACHINES. IN BUSINESS SINCE 1840

659 EVANS AVE. . . . CINCINNATI, OHIO

GEAR CUTTING MACHINES

New Design
New Features
New Advantages

NEWARK GEAR CUTTING MACHINE CO.
69 Prospect Street, NEWARK 5, NEW JERSEY
FRANK E. EBERHARDT, *President*

ABRASIVE

ACCURACY BOOSTS PRODUCTION

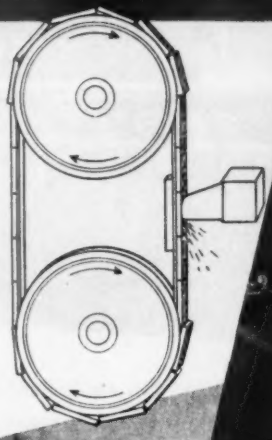
No. IG	INTERNAL GRINDER	**No. 34**	VERTICAL SPINDLE SURFACE GRINDER
No. 1½	HAND FEED SURFACE GRINDER	**No. 3B**	AUTOMATIC FEED SURFACE GRINDER

Look for Our Full Page Advertisements

ABRASIVE MACHINE TOOL CO.
EAST PROVIDENCE 14, RHODE ISLAND

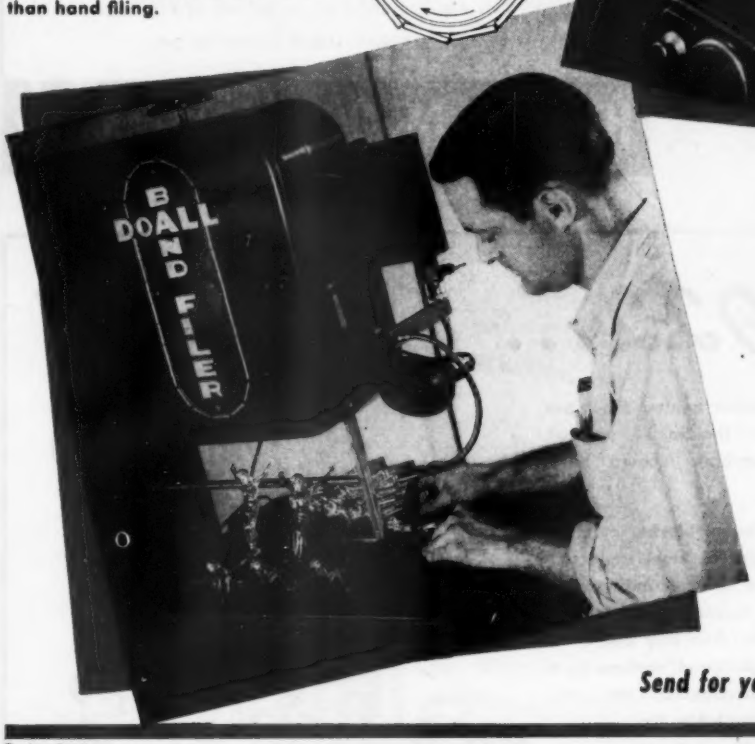
2 WAYS TO REMOVE FLASH

Both **DoALL**



You can do it on the DoALL Contour Machine or on a DoALL Band Filer. Both accommodate the ⅜" File Band which finished these metal statuettes at the rate of one per minute.

The DoALL method is a smooth, continuous, one-way operation with no loss of time, motion or energy. Today's fastest way to finish parts or products made from metals, alloys, plymetals. And, it's 4 times faster than jig filing, 9 times faster than hand filing.



Contour Machine **— Thousands are in use today shaping parts used in important war equipment. Although used primarily for internal and external sawing, file bands are included as standard equipment with each DoALL Contour Machine.**

Band Filer **— For continuous filing here's the best solution — a variable speed precision machine that accommodates work up to 6" thick. The 18" square work table tilts for angle filing. Occupies only 27" x 34" floor space.**

Send for your copy of circular **BAND FILING TO PRECISION TOLERANCES**

Contour Sawing

Band Filer

Super Surface Grinders

Grinding Wheels and Magnetic Chucks and Sebastron

Colloidal Cutting Oils and Soluble Oils

Dust Collectors and Coolant Systems

Variable Speed Pulleys SPEEDMASTER

Band Saws

Band Files

Inspection Laboratory GAGE BLOCKS with Instruments

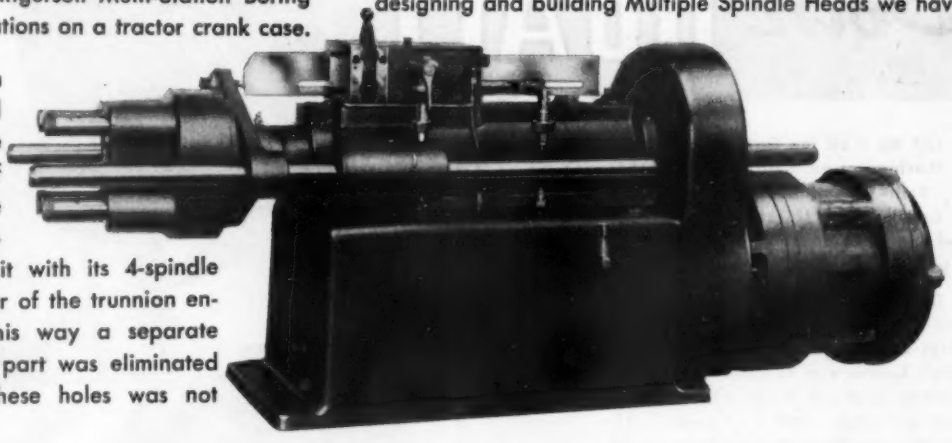
DoALL INDUSTRY'S NEWEST OF TOOLS

CONTINENTAL MACHINES, INC.
1310 S. Washington Ave. • Minneapolis 4, Minn.

4 Spindle HOEFER HEAD Eliminates Separate Handling of an unwieldy part . . .

HOEFER
MULTIPLE DRILLING HEADS

A 5 H.P. Hoefer Hydraulic Unit on which is mounted a 4-spindle Hoefer Head carried on guide bars. Tied into the fixture through a mounting bracket, the head became a part of a large Ingersoll Multi-Station Boring Machine performing operations on a tractor crank case.



The four holes are at a 30-degree angle to all other operations and are done during the time of the other operations. The control is hydraulic, automatically starting our unit with its 4-spindle head by the index plunger of the trunnion entering its bushing. In this way a separate handling of an unwieldy part was eliminated and the extra jig for these holes was not necessary.

If you have a multiple drilling problem, the chances are we have furnished a multiple spindle head for similar use. Our engineering department is ready to work with you now to determine the right head for your job.

In our more than thirty years of concentrated effort in designing and building Multiple Spindle Heads we have produced this equipment for unlimited applications and in designs of every conceivable construction.

Hoefer's Whole Business is Holes . . . .

HOEFER MFG. CO. *Freeport, Ill.*

Ever since 1922...

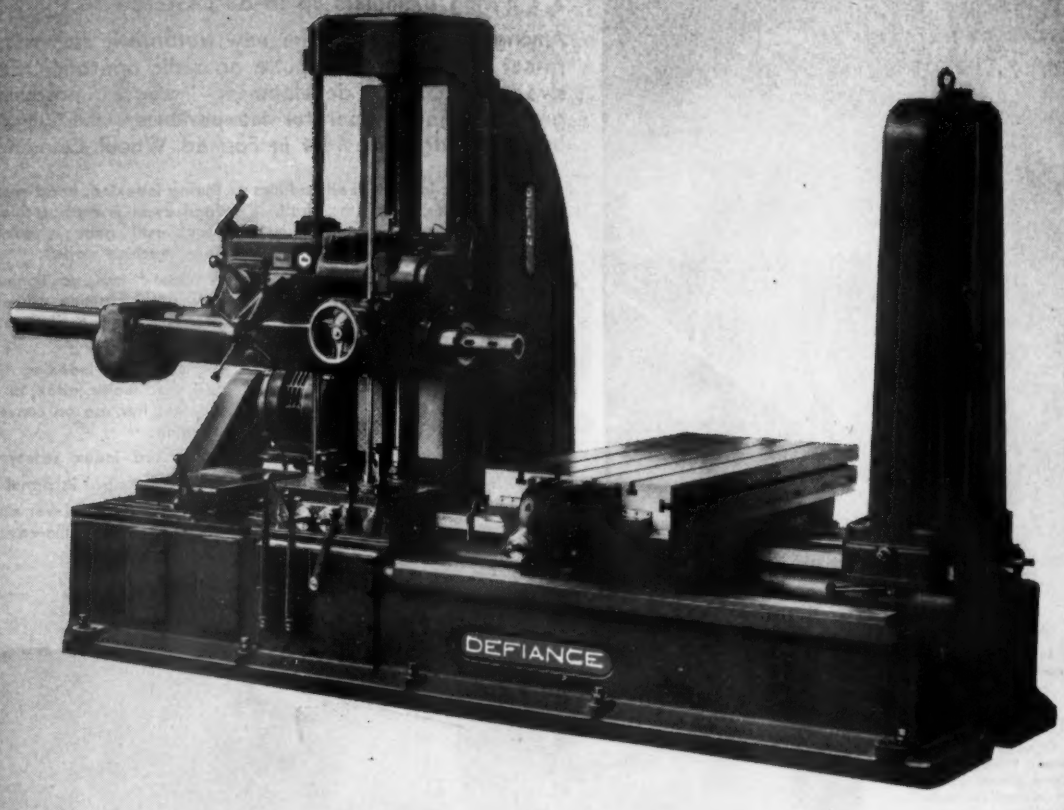
when the first Moline honing machine was built, Moline honing machines have been continually modernized and developed until the No. 15, vertical, single-spindle, hydraulically-reciprocated honing machine, shown here, is the ultimate in modern honing equipment.

Here's what this machine can do: hone engine cylinder blocks, cylinder inner sleeves, radial type engine cylinders, brake drums, steel and cast-iron bushings—in fact any honing job within its range where conditions do not require a multiple spindle machine. In fact it is recommended, too, for reconditioning of internal combustion engine cylinders. And any degree of finish can be produced on the No. 15, from a rough-honed surface to a highly-polished, glossy-smoothness. The Driving mechanism, the rotational speed, the hydraulic reciprocation, and the available fixtures for other types of honing are all outlined in specification sheet for the No. 15 Honing Machine. Send for your copy today.

The No. 15 with fixture for honing the cylinders of a six-cylinder engine clock.

MOLINE TOOL CO.
MOLINE ILLINOIS

DEFIANCE



DEFIANCE stands for Accuracy... appreciated today more than ever on America's "production front"... where Defiance Mills are helping plants beat tough production schedules with *speed* and *accuracy*.

Defiance Machine Works, Inc., Defiance, Ohio

Makers of Precision Machinery Since 1850

New GEARGRIND

FORMED WHEEL GRINDER

HERE'S a new Heavy Duty GEARGRIND that grinds gears having diameters up to 33", GG 33-30.

Among its features* is the new **automatic down feed and re-set** mechanism, for impulse or cyclic operation. This exclusive GEARGRIND development increases production and protects against operator inexperience, while retaining all the advantages inherent in Formed Wheel Grinding.

*Automatic impulse feed reduces grinding time to less than half.

Total down feed readily adjusted over wide range.

Number and size of cuts infinitely variable, and once set is automatically repeated. No cams or retooling required. Cuts may be diminished as finish size is approached.

During indexing, head resets and feed cycle is repeated on each tooth until gear is completed. Then machine stops.

Automatic trim positioning provides for trimming wheel after predetermined number of teeth have been ground.

Big saving in indexing time by fast, fluid motor index, or double indexing for use on conventional grinding.

Interlocked index safety circuit.

Electrical control in panel wiring.

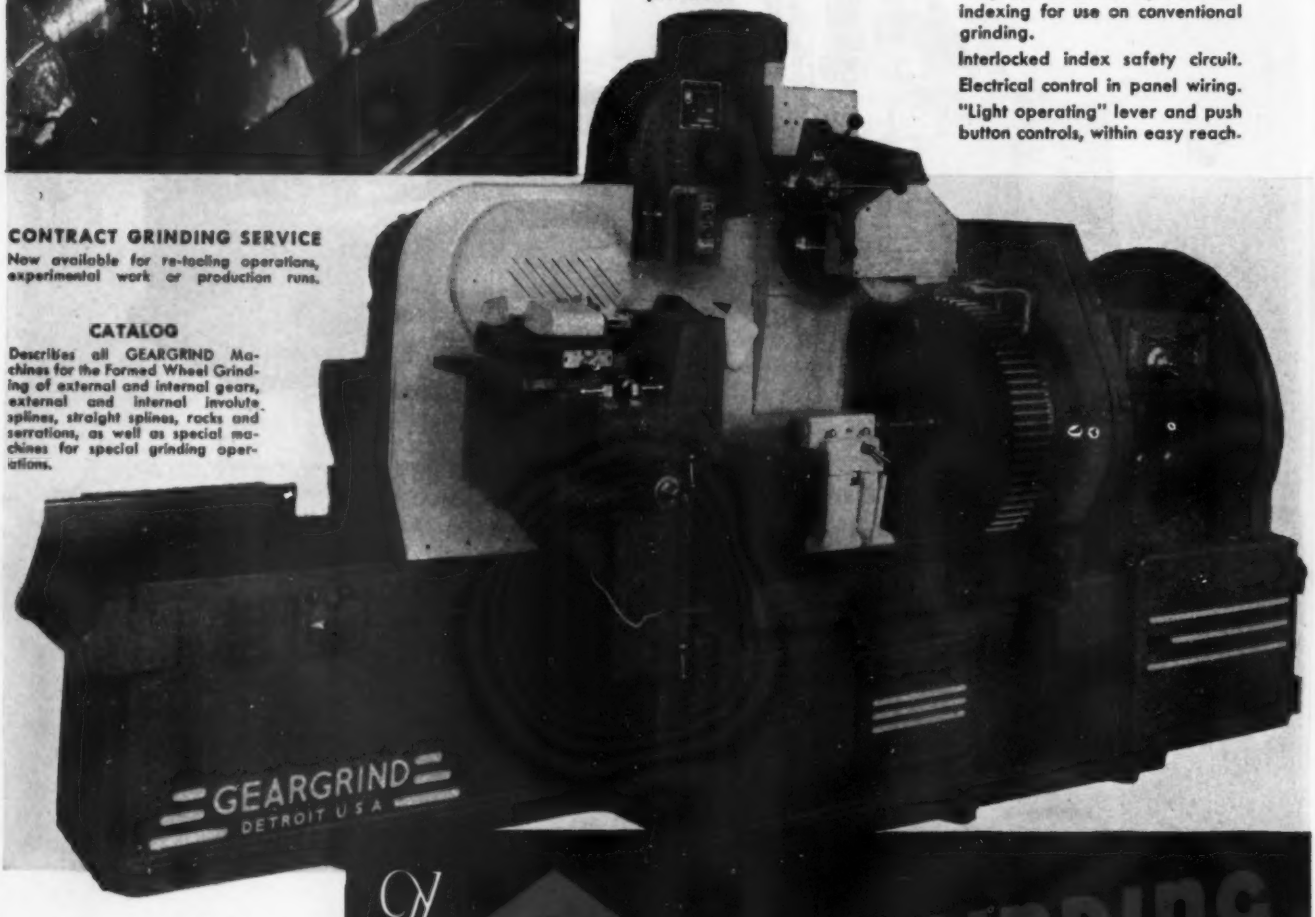
"Light operating" lever and push button controls, within easy reach.

CONTRACT GRINDING SERVICE

Now available for re-tooling operations, experimental work or production runs.

CATALOG

Describes all GEARGRIND Machines for the Formed Wheel Grinding of external and internal gears, external and internal involute splines, straight splines, racks and serrations, as well as special machines for special grinding operations.



RZEPPA Constant Velocity UNIVERSAL JOINTS

The GEAR GRINDING MACHINE COMPANY
DETROIT 11, MICH. U.S.A.

Joe:

HERE IS WHY PRECISION SURFACE GRINDING IS NO LONGER THE BOTTLE NECK IN YOUR TOOL ROOM

Bill

★ Rigid construction. Our GRAND RAPIDS Hydraulic Feed Surface Grinders are built around a heavy, rugged, one-piece column and base casting which guarantees permanence of alignment between vertical head ways and cross travel ways.

★ Vickers vane type hydraulic pumps and control valves designed by the engineers of the GALLMEYER & LIVINGSTON COMPANY make it possible to produce fine, accurate work while running machines at maximum longitudinal table speeds ranging from 80 feet per minute in the case of the small 6" x 8" capacity grinder to 125 feet per minute in the larger machines.

★ Precision flange type preloaded ball bearing spindle mounted in heavy rigidly constructed head is driven by motor of ample power through vee-belts and provision is made for two usable spindle speeds.

★ These machines are equipped with patented vertical movement of wheel head mounted in a location convenient to the operator and providing for the circular Vernier reading from a small flat graduated dial in the center of the hand wheel. The large outer hand wheel provides for rapid raising and lowering the wheel head while the smaller inner wheel provides for the final setting.

★ All machines are equipped with Bijur one-shot lubricating system by means of which all bearings and working surfaces except spindle bearings and motor bearings are conveniently and properly lubricated.

★ If you are interested in modern high-speed Hydraulic Feed Surface Grinders in which tool room accuracy is combined with production speeds, we suggest that you ask for bulletin GL-100.

GALLMEYER & LIVINGSTON CO

330 STRAIGHT AVE. S. W.

GRAND RAPIDS, 4 MICHIGAN

Hammond
OF KALAMAZOO

"GRINDING and POLISHING DEVELOPMENTS"

SAYS H. J. KINGSBURY
CHIEF ENGINEER

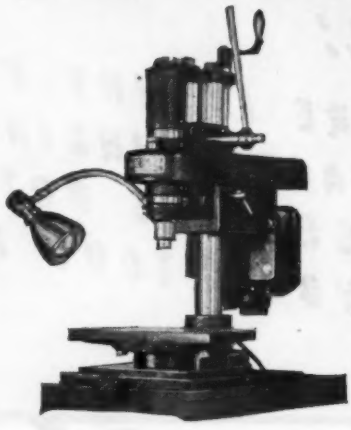
" . . . have brought out many outstanding features in the Hammond's line of grinding and finishing equipment, some available now, others will be ready to enable you to improve quality and lower your costs in postwar production. Prominent among these is a complete line of Abrasive Belt machines for grinding, polishing and deburring round, flat and irregular shaped parts.

Hammond builds a complete line of Carbide, Abrasive Belt and Wheel Grinders • Polishing and Buffing Lathes • Automatic Polishing and Buffing Machines • Cylindrical Finishing Equipment."

Hammond Machinery Builders INC.

1618 DOUGLAS AVE. - KALAMAZOO 54, MICH.
Eastern Branch: 71 W. 23rd St., New York 10, N.Y.

FLEXIBLE.... EASY TO OPERATE FOR SMALL PRECISION DRILLING



MAXI-JR-E
Super-Sensitive Drilling Machine

For drilling small holes from .004" to .250" diameter.

A self-contained drilling unit which swings radially on the column and can be locked in any desired position.

Full floating spindle of special design which eliminates radial belt pull on the spindle.

Distance from center of chuck to column, 5 inches. Vertical work capacity from base to chuck, 10 in. Possible spindle speeds from 750 to 12,000 r.p.m.

Can be ganged for sequence operations or to obtain greater production.

for

- BETTER SEEING
- BETTER FEELING
- BETTER DRILLING

The Hamilton Tool Co.
830 NINTH ST. HAMILTON, OHIO

SERVICE!
There's a
LELAND GIFFORD
service man in your vicinity, but you probably will never need him.
MOTOR SPINDLE DRILLING MACHINES 1 TO 6 SPINDLES

LELAND GIFFORD
WORCESTER, MASSACHUSETTS

MILLHOLLAND
Automatic DRILLING - BORING MILLING - TAPPING Units
½ to 20 HORSEPOWER DRIVE
AUTOMATIC and SEMI-AUTOMATIC PRODUCTION MACHINERY
W. K. MILLHOLLAND MACHINERY CO.
Indianapolis, Ind.

Facts AIMED AT YOUR PRODUCTION SCHEDULES

HIGH SPEED AND ACCURACY IN AUTOMATIC PRODUCTION OF SMALL PARTS

Six to Eight different operations performed on each piece during single cycle of horizontal indexing dial.

•

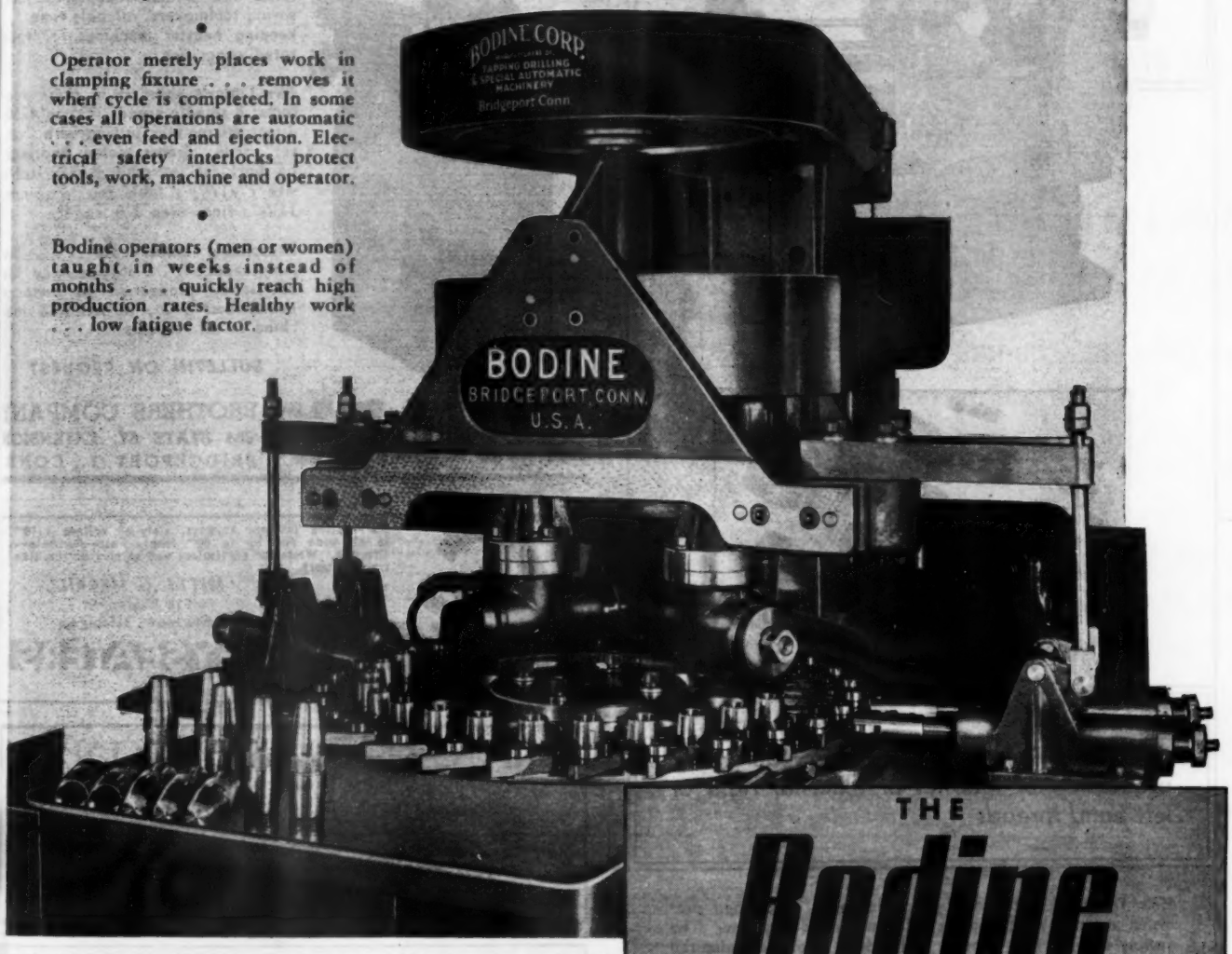
Spindles may be located to operate vertically, horizontally, at an angle, or inverted . . . each at different speed...to 20,000 r.p.m.

•

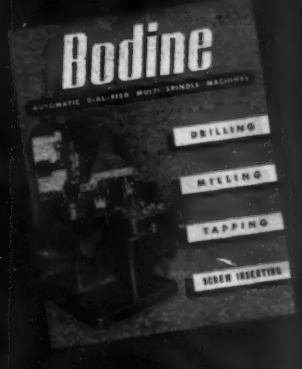
Operator merely places work in clamping fixture . . . removes it when cycle is completed. In some cases all operations are automatic . . . even feed and ejection. Electrical safety interlocks protect tools, work, machine and operator.

•

Bodine operators (men or women) taught in weeks instead of months . . . quickly reach high production rates. Healthy work . . . low fatigue factor.



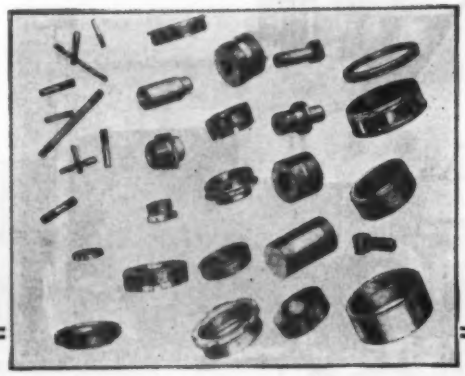
THE **Bodine** CORPORATION
BRIDGEPORT CONNECTICUT
AUTOMATIC DIAL TYPE DRILLING, MILLING, TAPPING, AND SCREW INSERTING MACHINES



Send for Dial Machine BULLETIN. Fully describes 6 standard sizes, shows typical set-ups, explains operations. Complete engineering data. Recommendation from your blueprints or sample parts.

DRILLING, MILLING, TAPPING, SCREW INSERTING *Simultaneously*

Any parts that can be chucked can be threaded on the COULTER HOB THREAD MILLER



. . . a universal machine for automatic production of internal or external right or left hand threads

Hob Threaded work can be handled with speed and precision on this rigid, simple fully motorized machine. The variety of work it is capable of handling is almost unlimited because any parts that may be held by chuck or special fixture can be threaded. The design of this machine is such that long work can also be accommodated.

Work and cutter spindles are each driven by individual motor, a wide range of speeds and feeds being available for threading of parts of various materials. Once the machine has been started on the first piece, the entire operation is automatic until time for unloading.

Explore the possibilities of the "Coulter" on your external and internal threading by writing for further information.

THE JAMES COULTER MACHINE CO.
BRIDGEPORT, CONNECTICUT

READY TO SET AND GO...

for a thousand TOUGH LITTLE JOBS

When shops get jammed up with work, many jobs are scheduled on machines of larger-than-needed capacity. This is a wasteful procedure . . . a good reason why a Linley Miller and Jig Borer should be installed. You can rapidly and accurately clean up the steady run of die work, jigs, models, metal patterns and similar machining jobs, saving toolmakers' valuable time . . . keeping heavier machines for their rated capacities.

The Linley's value is in these features: 8 spindle speeds, 275 to 4250; direct micrometer setting with "velvet" feed; grease-sealed bearings; no backlash in quill travel; table size 7"x17½"; table top to spindle 11½"; floor area 2½ sq. ft.

Reasonable initial cost . . . low maintenance . . . long service life of steady production at reduced hourly cost . . . a precision machine in all respects

BULLETIN ON REQUEST

LINLEY BROTHERS COMPANY
664 STATE ST. EXTENSION
BRIDGEPORT 1, CONN.

For cutting internal keyways, slots or splines 1/16" to 4" wide and up to 60" long. Fast—Accurate—Flexible. Write for particulars and catalog on machine for your work.

Giant KEYSEATERS

MITTS & MERRILL
913 Tilden St.
Saginaw, Michigan

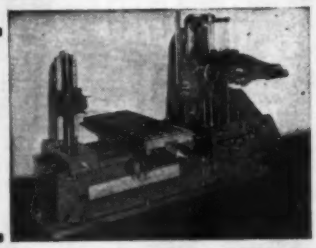
LUCAS "PRECISION"
Horizontal Boring, Drilling and Milling Machine
THE LUCAS MACHINE TOOL CO.

NOW AND ALWAYS OF

CLEVELAND
OHIO, U. S. A.

UNIVERSAL *Horizontal Boring Machine*
The only TRIWAY *Boring Machine Built*

Made in 3" and 4" spindle sizes. Write for complete, detailed specifications.

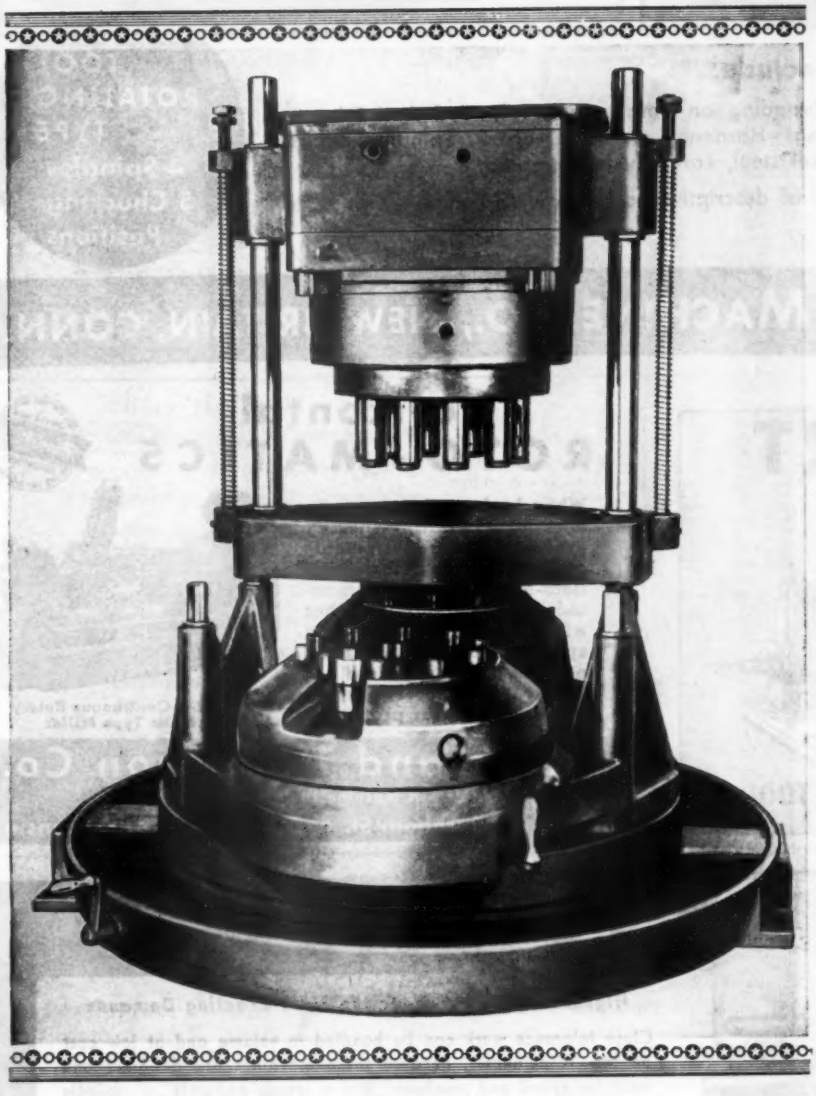


Standard Universal 3" Spindle Machine

UNIVERSAL BORING MACHINE CO.
Hudson, Mass., U. S. A.

Extra MANPOWER

FROM YOUR DPC DRILL PRESSES AND SPECIAL MACHINES WHEN RETOOLED BY BUHR HIGH PRODUCTION EQUIPMENT!



MULTIPLE DRILLING 10 HOLES IN ONE CYCLE

This entire tool-up is mounted on a standard drill press.

To eliminate loading time, the part is loaded in front portion of fixture (which is mounted on a 36" index) while the part in the rear position is being drilled by the 10-spindle drill head.

Guide bushings are provided for accuracy.

The bushing plate is located over two pins after indexing to drilling position.

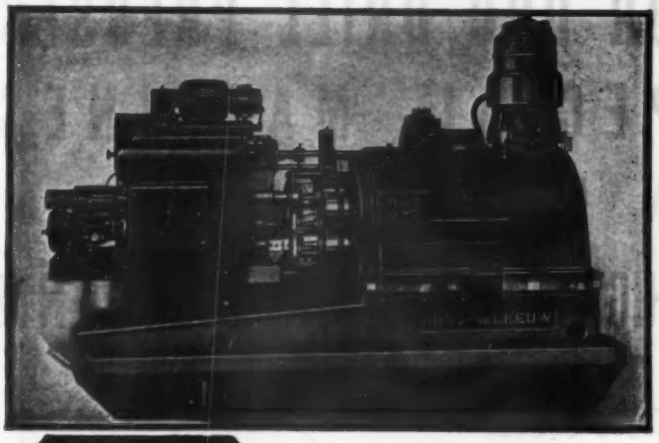
●

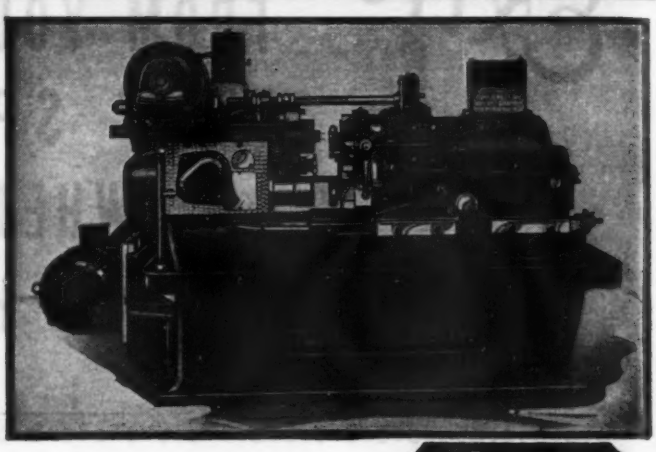
BUHR MACHINE TOOL COMPANY

843 GREEN STREET • ANN ARBOR, MICH.

Specialists in Multiple-Spindle Drilling, Reaming, Boring and Tapping Equipment

GOSS & DE LEEUW *Multiple Spindle* CHUCKING MACHINES





WORK ROTATING TYPE
5 Spindles
6 Spindles
8 Spindles

Features include:

Lead Screw Threading on both types—Preloaded Anti Friction Spindle Bearings—Hardened Ways—Oversize Spindles—Gears of Chrome-nickel steel, carefully heat-treated.

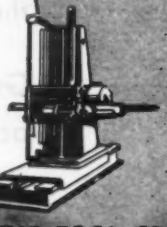
Write for copy of descriptive catalog giving complete, detailed specifications.

TOOL ROTATING TYPE
4 Spindles
5 Chucking Positions

GOSS & DE LEEUW MACHINE CO., NEW BRITAIN, CONN.

GILBERT

PRODUCTION SPEEDING RADIAL DRILLS AND HORIZONTAL DRILLING, BORING AND MILLING MACHINES

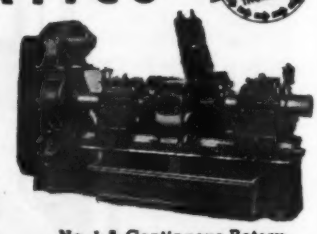


DETAILS ON REQUEST

THE CINCINNATI GILBERT MACHINE TOOL CO.
CINCINNATI, OHIO

Horizontal ROTO-MATICS

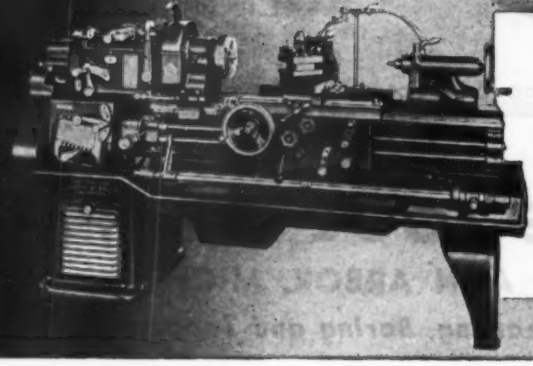
When high production is in demand on your machining problems your requirements can be met with a Horizontal Roto-Matic. Continuous, non-indexing operation together with roughing and finishing spindles insure maximum output. *Bulletins 110 and 120* are available for suggested solutions to your problems.



No. 1-A Continuous Rotary Drum Type Miller

Davis and Thompson Co.
Mfrs. of Machine Tools and Micrometers
6411 W. Burnham St. Milwaukee 14, Wisconsin

CINNATI LA



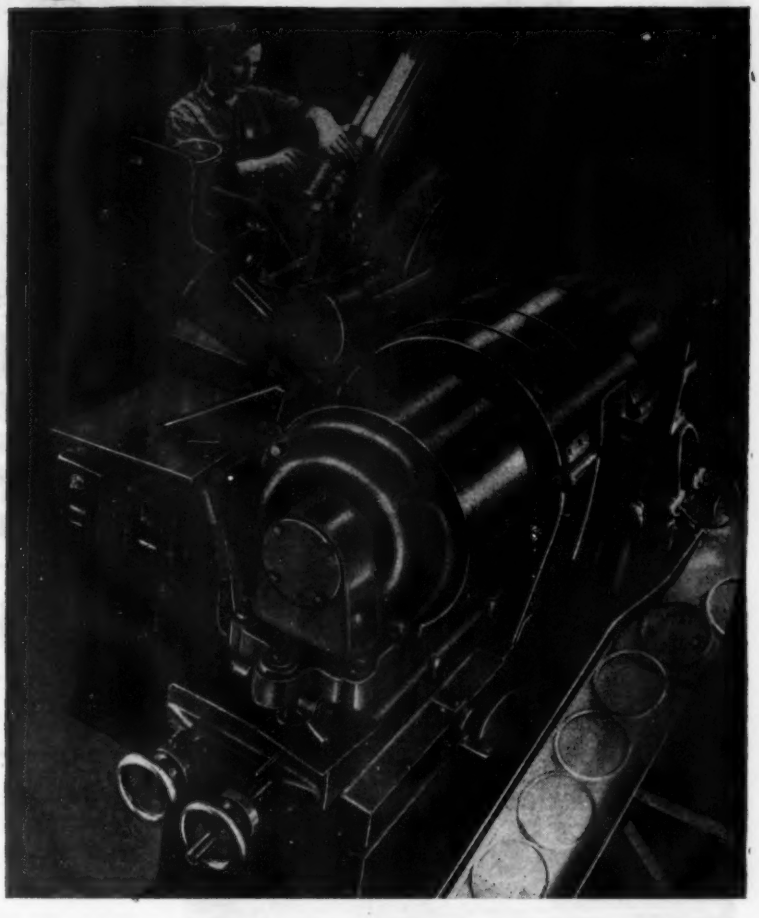
Highest Accuracy under the Most Exacting Demands

Close tolerance work can be handled in volume and at low cost on the "Cincinnati", because these machines are designed and built for speed and precision. Bed is sturdy and stiff . . . spindle mounted anti-friction . . . ways and carriage hand scraped . . . headstock gears hardened and ground. Made in sizes from 14" to 30". Full details on request.

THE CINCINNATI LATHE & TOOL CO.
Rogers Road, Oakley SPECIALISTS SINCE 1906 Cincinnati, Ohio

PARALLEL SIDES PRECISION-GROUND AT THE SAME TIME --AT HIGH PRODUCTION RATES

HANCHETT
Double Spindle
Disc Grinders
Do it Every Day



These No. 221 Hanchett Double Spindle Grinders are rough and finish grinding piston rings at a high production rate. Bearing races, retainer rings, turbine blades, thrust washers, springs plus a multitude of other similar parts are rolling off Hanchett Badger Grinders daily.

One of the six sizes of Hanchett Double Spindle Grinders can be quickly adapted to meet *your* production requirements . . . fully automatic, semi-automatic or hand operated. Cast-iron, molded products, die castings, plastics and other materials of various sizes and shapes are being ground on these Hanchett "Badger" Grinders. Holding to close tolerances while maintaining consistent high production output is, as always, a built-in Hanchett engineering principle. Our engineers stand ready to help you.

For further details contact your nearest Hanchett dealer, or write direct for Bulletin 640-1 AD.

HANCHETT GRINDERS — BIG RAPIDS MICH.

IF IT'S A FLAT SURFACE—THERE'S A HANCHETT TO GRIND IT

HANCHETT MANUFACTURING CO.
BIG RAPIDS, MICHIGAN U.S.A.

The wide range of circular cutters with both single and double bevel cutting edges are ground to exacting requirements for parallelism, finish and thickness by Simonds Steel & Saw Company. These requirements are readily obtained by the versatile

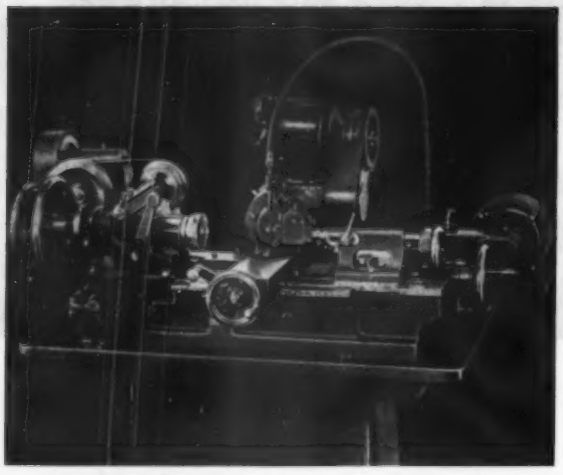
ARTER

Rotary Surface Grinder

ARTER

ARTER GRINDING MACHINE COMPANY

WORCESTER, MASSACHUSETTS • U. S. A.



WALTHAM THREAD MILLERS

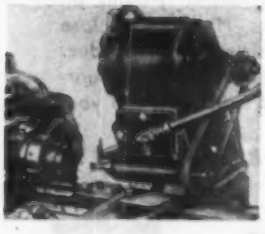
provide versatility and precision in small thread production

Designed especially for small work calling for close tolerances, WALTHAM THREAD MILLERS can be depended on to meet the most exacting specifications for precision parts.

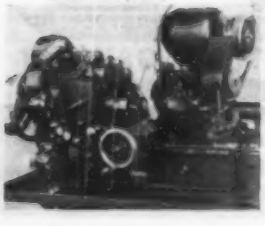
An outstanding feature of these improved machines is the use of three motors, one each for driving cutter, work and pump. Machines can be arranged with speeds suitable for brass or steel or both. Motors are wired so that a single start and stop station will control all at one time.

Standard equipment includes three motors with control, follow rest, milling cutter, indexing device, 5 pitch lead screw and change gears for cutting from 5 to 40 threads per inch.

A wide range of special equipment is available and greatly enlarges the usefulness of this machine. Full details on request. Write for Bulletin 244A.



(Left)—Waltham Thread Miller equipped with Internal Threading Attachment.



(Below)—Waltham Thread Miller equipped with Relieving Head.

CONDENSED SPECIFICATIONS

Swing over carriage—3"
Dia. work handled—2" or smaller
Thread length (work held on centers) —8¼"
Thread length (work held in chuck)—10"
Max. Dist. between centers—12"
Floor Space—48"x34"
Net Weight—850 lbs.

WALTHAM
TRADE MARK REGISTERED U.S. PAT. OFF.

WALTHAM
MACHINE WORKS,
WALTHAM, MASS.

Here's why you get these advantages with . . .

SUPERLA SOLUBLE OIL

1 Easy to mix with hard or soft water

2 Forms stable emulsions—does not separate

3 Helps prevent rusting of work and machines

4 Gives longer tool life

HAVE YOU hesitated to take advantage of the economy of emulsified cutting fluids because of past difficulties with oils that were hard to mix, that rusted parts, or gave poor tool life? All these objections were given serious consideration in the development of Superla Soluble Oil. All had to be eliminated to produce a truly improved soluble oil.

How these difficulties are overcome in Superla Soluble Oil is briefly described at the right. The record of Superla Soluble Oil on wartime jobs and its acceptance by many machine tool manufacturers are further proof. A Standard Cutting Oil Specialist will be glad to help you apply Superla Soluble Oil in the proper mixes, to machining jobs in your plant, as a test. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the Cutting Oil Specialist near you.

A soluble oil consists of oil and soap. This soap is not ordinary laundry soap, but its function is somewhat the same. Its purpose is to form an emulsion between the oil and water used in the final cutting fluid.

The type of oil and the amount and nature of soap used determine how easily the oil emulsifies and the permanence of the emulsion.

The soap in Superla Soluble Oil has the property of dispersing the oil in very fine particles in the emulsion. This gives two advantages. First, Superla mixes readily even with hard water without special equipment for agitating or stirring. Second, the smaller particles of oil are dispersed throughout the batch. This even distribution of the oil gives greater protection to tools. Where cooling is of greatest importance, lean emulsions can also be used without danger of parts rusting, because the finely divided oil particles form a film on parts and machines when the water is properly evaporated. In addition, the emulsion is more stable, because the finely dispersed oil particles have less tendency to collect at the top of the tank if the emulsion stands.

Superla Soluble Oil is also non-injurious to workers and does not become rancid or develop strong odors.

If hard water conditions in your locality or other factors have prevented you from using soluble oils, let a Cutting Oil Specialist show you how easily Superla Soluble Oil will overcome your difficulties.

Buy more War Bonds

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . .

LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . .

LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . .

It was easy to pick the right grease then...

When greasing a wagon or mill wheel was the only lubrication problem, and the principal choice of lubricant lay between bacon rind and axle grease, everyone was his own lubrication specialist. The oak or maple bearings on the old mill wheels could be replaced every winter, if needed. If the grease on wagon wheels became too stiff in cold weather, the horses pulled harder. But horsepower today is more temperamental.

Many factors now enter into the selection of grease: such as types of bearings, bearing clearances, pressures or loads, temperatures, speeds, and the many possible combinations of these. To meet these conditions, there are numerous types and grades of grease, with various oil viscosities, penetration characteristics, and temperature- and water-resistant qualities.

Fitting these many types of grease to the countless jobs requiring grease lubrication in industry is a specialist's work. Standard Oil has such specialists. The Lubrication Engineer in your locality will help you with this problem. He has a wide range of products from which to choose. He's had years of practical experience in applying them.

Why not put your grease lubrication in the hands of the Standard Oil Lubrication Engineer near you? Let him help you start saving horsepower and maintenance *now* for the coming competitive post-war period.

Buy more War Bonds

Cup Grease. Lime soap base, low viscosity oil.

Cup or Pressure Gun Grease. Lime soap base, medium or medium heavy viscosity oil.

Fibre Grease. Soda soap base, medium viscosity oil.

Short-fibre Grease. Soda soap base, medium viscosity oil.

Compound. Usually no soap base, special petroleum stocks.

STANDARD OIL COMPANY (INDIANA)

STANDARD SERVICE

★ LUBRICATION ENGINEERING

REQUISITION

ANCHOR-WAY MFG. CO.

QUANTITY	DESCRIPTION
1	Yankee Twist Drill Grinder

Joe Black
TOOL ROOM SUPERVISOR

"A Yankee TWIST DRILL GRINDER"

Yes, shop men everywhere with an eye on production costs are installing Yankees—to eliminate expensive drill grinding.

YANKEE SINGLE END WET

- ★ Direct Motor Drive . . . . . 1½ HP
- ★ 12" Dia. Wheel . . . . 1735 RPM
- ★ Drill Size Capacity . . . . . ½" to 4"
- ★ Adaptable for Dry Grinding
- ★ Has Point Thinning Wheel

When you specify a Yankee Twist Drill Grinder, you are talking in terms of More Holes . . . Longer Drill Life . . . Greater Plant Efficiency. A Yankee is the one sure way of maintaining a constant flow of accurately ground drills from tool crib to drill presses—at a dollar-saving that is unbeatable. It requires no special skill to operate . . . has a Quick Set-up feature permitting rapid change-over from one size to another. Can be furnished with holders to sharpen drills as small as No. 30.

See Your Nearest COVEL Dealer or Write for Bulletin A-105.

GRINDING MACHINERY SINCE 1874

COVEL INDUSTRIAL GRINDERS

COVEL MFG. CO., BENTON HARBOR, MICHIGAN U. S. A.

PEERLESS HYDRA-CUT

THE *Power Saw* WITH 4-SIDED *Saw-Frame*

The B-32 Dominator Bomber is a specialty at the Fort Worth Plant of Consolidated Vultee.

Consolidated Vultee

THIS busy producer of aircraft cuts billets and large bar stock the fast, accurate way — with a POWER SAW!

SAWING off test samples for inspection purposes is number one method as approved by government engineers. SAWING does not heat and harden the metal at the face of the cut. The cool-running, straight-cutting blade removes as little as 1/16" of the precious metal. Peerless Saws cut accurately to the tolerances required in our vital airplane production.

SAWING the Peerless way with the Four-Sided Saw-Frame and Backing-Plate Blade-Support is an interesting story—told in a simple, pictorial way in a new bulletin, number HC-50. A note on your letterhead will bring a copy to you.

Dealers in all principal cities
Address Dept. AM-545

PEERLESS
MACHINE COMPANY
RACINE • WISCONSIN

— No. 101 "PRODUCTION" —

CENTERLESS FEED POLISHING MACHINE

No special skill required to produce fine work

This high speed automatic machine for polishing and buffing cylindrical work will give any grade finish at fastest feeds and lowest costs.

Wheel mounting is unusually heavy, the shaft running in heavy self-aligning ball bearings and driven by a triple V-belt. Quick adjustment is provided for wheels and a trueing device for trueing wheels while in motion. A centerless feed mounted in tilting housing provides for varying speed feeds. All parts are easily accessible.

Write for illustrated bulletin giving full details.

PRODUCTION MACHINE CO.

Manufacturers of Drilling Machines, Tool Grinders and Hand and Automatic Polishing and Grinding Machines.

GREENFIELD, MASS., U. S. A.

DAVIS KEYSEATER

This low cost machine will handle internal keyseating jobs up to 1¼ in.

Write for illustrated bulletin.

DAVIS KEYSEATER CO., 403 Exchange St., Rochester, N. Y.

Sensitive DRILLING MACHINES
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CINCINNATI OHIO

ACROMARK your products ..FASTER!

STAMPS BOTH LETTERS AND FIGURES INTO STEEL AND ANY METAL OR PLASTIC

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ELIZABETH, NEW JERSEY

L-W

High Speed

POWER HACK SAWS

Low Price - High Quality

Immediate Delivery

The Ideal Saw for any Shop

GRAVITY FEED
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EXPANDING CLUTCH
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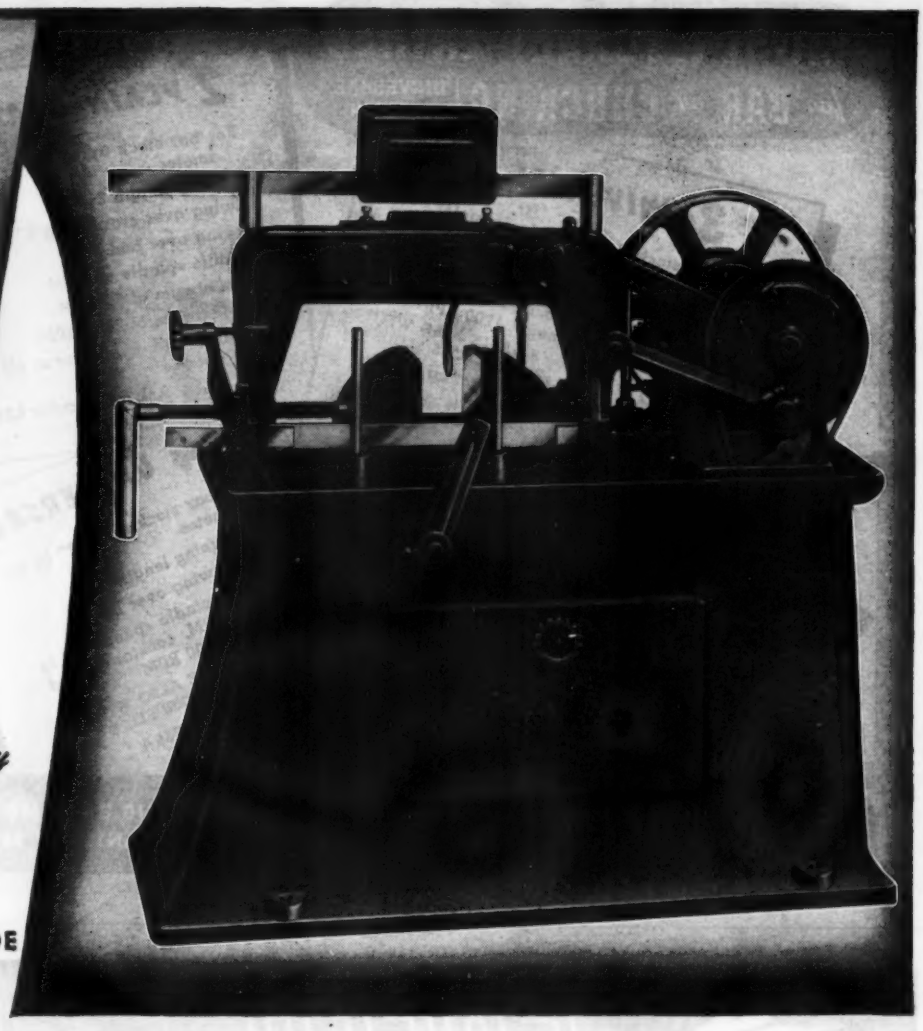


● Automatic trip stops machine on completion of cut . . . automatic relief of saw blade on non-cutting stroke . . . 6" x 6" capacity with 10" to 14" blades . . . Clutch pulley 12" x 3" . . . pulley speed 120 R.P.M. Saw frame is designed for maximum rigidity. Sliding bearing is dovetailed to fit arm and is adjustable in all directions. Belt drive type, $180.15.

Furnished on request, is the 3-speed V-belt Motor Drive arrangement to permit speed adjustments from 90 R.P.M. to 130 R.P.M.; motor, additional.

Motor recommended for use with drive arrangement— ½ H.P. standard speed, 1725 R.P.M.

Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products

L-W CHUCK COMPANY

5 N. ST. CLAIR ST.
TOLEDO 4, OHIO

MOREY TURRET LATHES
for BAR or CHUCKING { UNIVERSAL or PLAIN

3 UNIVERSAL

For bar stock up to 1½" in diameter
10" turning length
16½" swing over bed
Infinite spindle speeds: 55 to 1800 RPM. constant speed motor, 1200 RPM
AVAILABLE ALSO WITH PLAIN CROSS SLIDE
Ask for Circular 727A

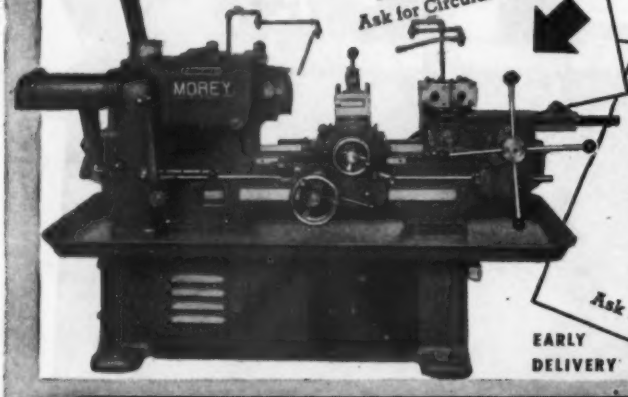
2 PLAIN-GEARED

For bar stock up to 1" in diameter
Turning length 6½"
Swing over cross slide 6"
Swing over bed 14"
Infinite spindle speeds:
Minimum of 60 RPM.
Maximum of 2000 RPM.
Constant horsepower at all speeds.
Ask for Circular 629A

4 UNIVERSAL

For bar stock up to 2" in diameter
12" turning length
19½" swing over bed
Infinite spindle speeds: 35 to 1500 RPM. constant speed motor, 1200 RPM
AVAILABLE ALSO WITH PLAIN CROSS SLIDE
Ask for Circular 736A

EARLY DELIVERY



INFINITE SPINDLE SPEEDS —Electrically Selected—

DIRECT BELT DRIVE AVAILABLE AT HIGH SPEEDS ELIMINATES GEAR MARKS (patents applied for).

GEARED SPINDLE SPEEDS INSTANTLY AVAILABLE THROUGH MULTIPLE DISC CLUTCHES.

SPINDLE MOUNTED ON TIMKEN BEARINGS.

RIGID—WITH SUFFICIENT POWER TO TURN AT THE HIGHEST SPEEDS AND FEEDS MODERN TOOLS WILL WITHSTAND.

SPINDLE SPEEDS AND POWER FEED CHANGES WITHIN EASY REACH OF OPERATOR.

ARMY NAVY

THE DESIGN OF THE MOREY No. 2, 3 and 4 TURRET LATHES ARE BASICALLY ALIKE. EACH MACHINE IS ENGINEERED FOR THE SIZE WORK IT IS DESIGNED TO HANDLE.

DESIGNED AND BUILT BY
MOREY MACHINERY CO., INC
410 BROOME STREET, NEW YORK 13, N. Y.
PLANT: 4-57 26TH AVE., ASTORIA 2, NEW YORK

SPEED IN COLD METAL SAWING

The PORTER - McLEOD IS DESIGNED FOR HIGH SPEED COLD METAL SAWING

Straight, clean cuts on a truly high production basis are assured by the 8" Porter-McLeod. It is a compact, sturdy, amply powered unit designed for handling general or production work with utmost operating convenience and control. Economical quantities of bars or shapes can be "nested" and held rigidly during cutting by means of supports provided on sides and bottom combined with clamping pressure at top.

In the Porter-McLeod, the blade is supported for accurate cutting and for protection against damage. Adjustment is also provided for changes in blade thickness. Feed of blade is upward to stock with provision made to prevent weaving and buckling. Standard feeds up to 3" per minute are available. Protection against blade breakage due to hard spots in stock is provided by a friction feed disc.

This machine will handle either 8" round or 7½" square stock or the equivalent in "nested" work.

Investigate the high production possibilities of this machine by sending for descriptive Bulletin.

MACHINE TOOL COMPANY

PORTER-McLEOD MACHINE TOOL CO., INC.
HATFIELD, MASSACHUSETTS, U.S.A.

CARLTON *Radials* • • •

● Twenty-six years ago The Carlton Machine Tool Co. brought out the original low hung drive bringing the drive down underneath the arm driving off the large diameter of spindle closest to the work. This drive has proven not only theoretically correct but practically correct, and that with the other new features of the Carlton Radial Drill has proven itself through actual demonstration in customers' plants. One of the leading Radial Drills on the market today in this Country or any foreign country.

There are thousands of these radial drills being used by all the large leading manufacturing companies in the United States, as well as foreign countries. The upkeep and repair parts in the past 26 years has almost been nil.

The above photograph shows the variation and sizes that the Carlton Radial Drill is made from the small 9" column with 3' arm to 26" column with 12' arm, and are furnished with sizes in between column diameters 9", 11", 13", 15", 17", 19", 22", and 26". In arm lengths of 3', 4', 5', 6', 7', 8', 9', 10', 11, and 12. Furnished with all types of bases: standard base, right angle base, double end base, three way base, four way base, and round base to enable loading the base while the operator is drilling. Also with either plain box or universal tables.

The following features speed production and help produce more work, faster at lower cost. Low hung drive to spindle—anti-friction bearings throughout—centralized controls—unit construction—oiling required only once in six months—all drive parts running in oil—power rapid traverse to head and electro hydraulic column lock.

If your work calls for a radial you will get greater production—greater economy—greater satisfaction from a Carlton. Representatives in all large cities.

ARMY E NAVY

THE CARLTON MACHINE TOOL COMPANY

Manufacturers of RADIAL DRILLS *Exclusively*

CINCINNATI 25, OHIO, U. S. A.

SLOTTING

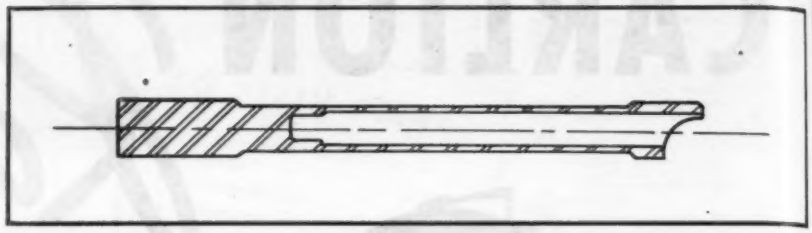
—WITH THE U. S. MULTI MILLER

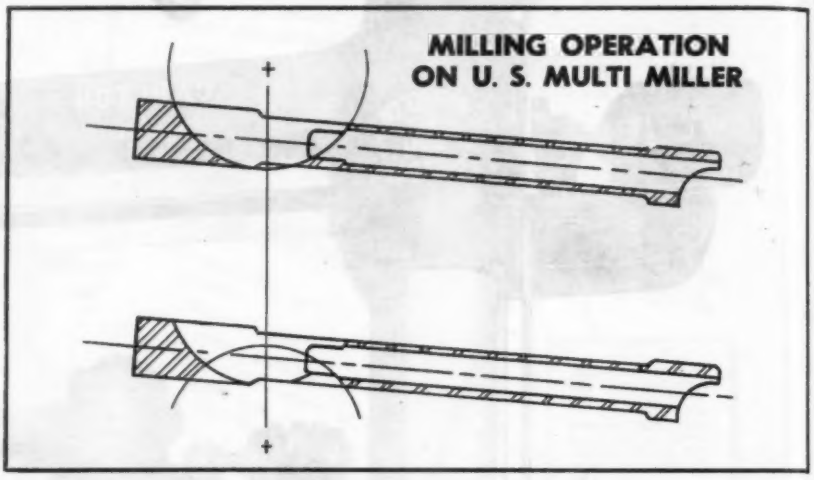
During the past few years, in many plants all over the country, standard types of machine tools have been adapted for the handling of an increasingly varied range of operations. In some instances machines have been observed handling jobs which in former years would have been considered impracticable.

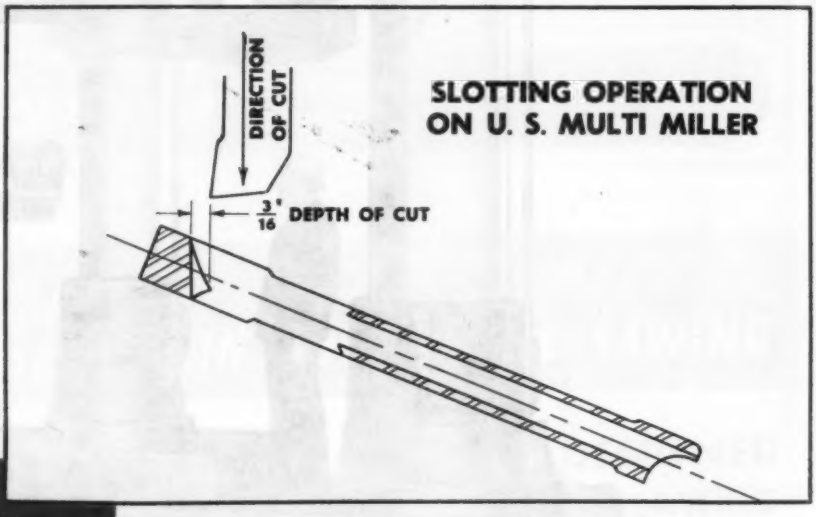
The illustration at the bottom of this page shows a U. S. Multi Miller equipped with a Slotting Attachment which has an adjustable stroke up to 2" maximum. At the right is a series of drawings showing the sequence of operations followed in machining the slot in the part shown below.

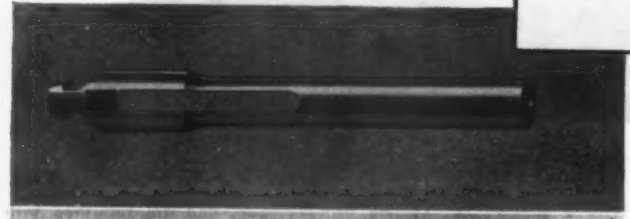
The upper drawing indicates the appearance of the work piece before the machining of the slot is started. The center drawing illustrates the preliminary milling of the slot. This operation is handled in two cuts on a U. S. Multi Miller equipped with indexing fixture. The slot is milled from one side; the fixture is indexed, and then the slot is milled from the other side.

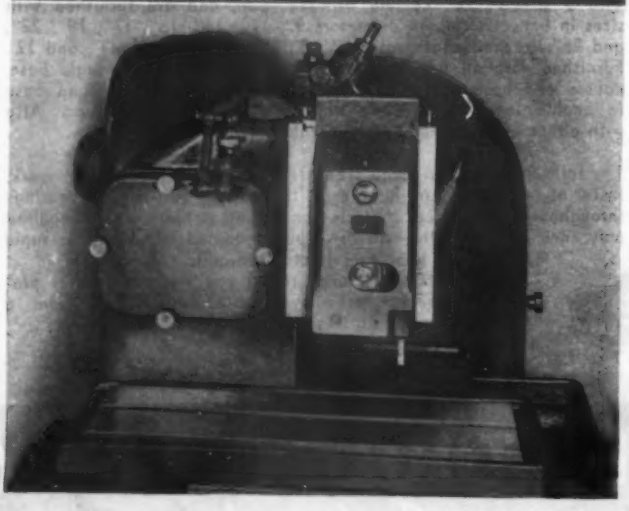
In the lower drawing it will be seen that a portion of metal remains after the preliminary milling operation. To remove this material the U. S. Multi Miller equipped with Slotting Attachment and automatic vertical motion of the head is used. The cutting tool in the Slotting Attachment reciprocates in an "up and down" movement and the depth of cut is accurately controlled by the cam fed table of the Multi Miller on which the work holding fixture is mounted. At the extreme depth of cut the forward motion of the machine table is automatically stopped; the entire head of the machine (cam controlled to operate in synchronization with the table) lifts and clears the cutting tool from the work. The table then returns rapidly to starting position. The piece is then removed from the fixture, a new piece is loaded, and the cycle is repeated.











This is just one of the many varied types of operations which can be handled to advantage on the U. S. Multi Millers. Our General Catalog AM contains complete specifications for these machines. Ask for your copy.

▼

U. S. TOOL COMPANY, Inc.

AMPERE (EAST ORANGE), N. J.

▼

BUILDERS OF U. S. MULTI MILLERS—U. S. MULTI SLIDES—U. S. AUTOMATIC PRESS ROOM EQUIPMENT—U. S. DIE SETS AND ACCESSORIES

pre-designed...

...TO SAVE YOUR TIME

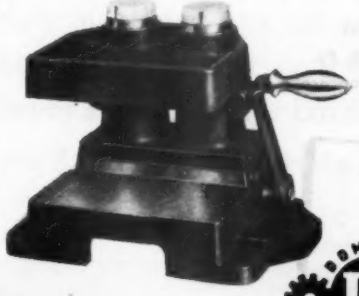
SIEWEK

FIXTURE CLAMPS AND FITTINGS

24 DIFFERENT TYPES... 3 SIZES EACH!

Also... **JACK LOCKS • CAM LOCKS • FIXTURE LOCKS • REST BUTTONS • HAND KNOBS • RESTS, CAMS AND EQUALIZING WASHERS**

Manufacturers of
SIEWEK
Rapid Clamping Drill Jigs



"SIEWEK TOOLS ARE SPEEDING THE WAR EFFORT"

There is no advantage in designing special clamps when Siewek Clamps will meet your needs perfectly nine times out of ten... In fact, you can buy these complete assemblies for less than the cost of designing them on your own drawing boards—and save 50 to 75% of the designing time... Siewek Clamps require a minimum of details to fit them to the job.

Right angle pressure is provided for secure holding... Siewek Clamps last for years because parts are specially heat-treated and hardened... This assures maximum service and safety.

Write today for full size template drawings from which tracings can be made for your layouts.

SIEWEK TOOL DIVISION
OF DOMESTIC INDUSTRIES, INC.
231 South La Salle Street **Chicago 4, Illinois**
Distributors in Principal Cities

FAMOUS FALLS No. 2

FLYING MARE

Wrestlers, like the boys above, use resin to keep from slipping. More and more maintenance men and safety engineers are using SPEEDI-DRI to eliminate slipping and expensive, bone-breaking falls on oil-soaked, greasy floors.

Introduced three years ago, SPEEDI-DRI is now used nationwide by thousands of industrial plants wherever spilled oil or grease causes a safety problem on wood, concrete or composition floors.

Insurance companies recommend it.

SPEEDI-DRI is easy to use. Just spread a carpet on an oil-slick floor, and it immediately furnishes a sure, skid-proof surface. Sweep it up, and your floor is dry and safe.

No more accident worries. No more complicated, time-consuming, floor-cleaning equipment. No more dangerous cleaning chemicals. No more "fast-fire" hazards from oil soaked floors. SPEEDI-DRI for oils and greases, SOL-SPEEDI-DRI for resins, syrups, coolants, solvents and acids as well as oils and greases. Send for a free sample.

SUPPLIERS: East — Refiners Lubricating Co., New York 1, New York.
Midwest & South — Waverly Petroleum Products Co., Philadelphia 6, Pa.
West Coast — Waverly Petroleum Products Co., Russ Bldg., San Francisco 4, Calif.

SPEEDI·DRI
OIL AND GREASE ABSORBENT

UL

ATKINS

FOR THE *Winning* STACK OF CHIPS

In 40 hours of cutting, an Atkins Silver Steel Curled-Chip Hacksaw Blade cut the mountain of chips at the left while a standard blade, operating for the same time, with the same feed and speed, on the same material cut the much smaller pile at the right. The Curled-Chip blade averaged 8 minutes per cut on 6" square SAE-1020 Leadloy compared to 14½ minutes per cut for the other blade.

More Evidence of "*Silver Steel*" Superiority

A comparison of actual cutting records provides the soundest basis — short of job demonstrations — by which to buy hacksaw blades. When the metal to be cut is non-ferrous and free-cutting machine steels, Atkins Silver Steel Blades with Curled-Chip teeth have a clear record of better performance on heavy duty machines. It's not only that these blades zip through steel in less time. Equally important is their long cutting life before regrinding (resulting in fewer stoppages for blade changes) and the parallel, burr-free cuts they make.

We'll gladly demonstrate these points on work you choose, at your convenience.

E. C. ATKINS AND COMPANY • 424 South Illinois Street, Indianapolis 9, Indiana

Agents or Dealers in Principal Cities the World Over

MAKERS OF BETTER SAWS FOR EVERY CUTTING JOB

Power and Hand Blades • Milling Saws • Segmental Cold Saws • Metal Cutting Bands

BIG NEWS FOR CARBIDE-TIPPED TOOL GRINDERS
Precision-grinding carbide-tipped tools and dies? Try the Por-os-way wheel with green silicon carbide—the remarkable grit now back from war. Por-os-way grinds faster, cheaper, won't burn or discolor. Put it to work!

2 TO 5 TIMES LOWER GRINDING COSTS

PROSPERITY after the war means high production, fair wages, helpful laws, sensible taxes . . . so all Americans can earn more, buy more, have more

*T. M. Reg. U. S. Pat. Off.

MACHINISTS are loud in their praise of Por-os-way. And no wonder, for this unusual wheel has made grinding history! Por-os-way's unique *open structure* cuts cleaner, cooler and *deeper*. It rough grinds and precision finishes hardest metals at a speed undreamed of only three years ago. Yes, men at the machines will tell you all this and more . . . how Por-os-way's record for fewer rejects helps boost production to a new high, how it pushes grinding costs to a new low.

Give *your* men the wheel they'll really enjoy working with and you'll give the boss rock-bottom costs to beat postwar competition. Set your grinding sights high and remember that Por-os-way has seldom been pushed to its limit. For *proof* call in a Por-os-way engineer and let him work out Por-os-way on your *toughest* job. A. P. de Sanno & Son, Inc., 430 Wheatland Street, Phoenixville, Pa., Since 1893.

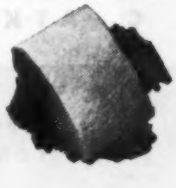
LOOK AT THE DIFFERENCE

Your eye tells you at a glance why Por-os-way is *different*. See the *extra porosity* that gives you over 8 distinct operating advantages!

RADIAC*
POR-OS-WAY*
The Precision Grinding Wheel

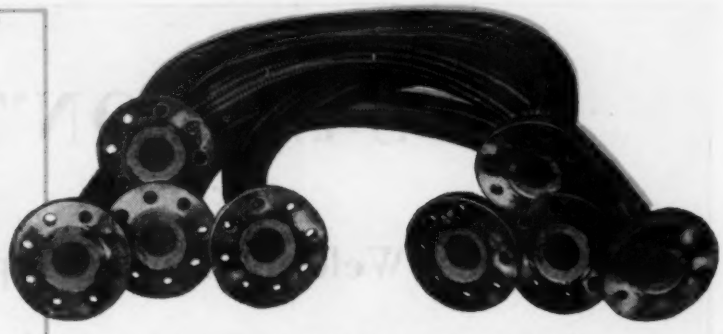
THE WHEEL THAT COSTS THE MOST AT FIRST . . . COSTS THE LEAST AT LAST

POR-OS-WAY "NOISELESS" SURFACE GRINDING ASTOUNDS MACHINISTS Do more surface and face grinding, faster, quieter with Por-os-way segments. Notice how moan, groan and grunt disappear . . . because Por-os-way *cuts* the metal, doesn't "scrape" the surface. Cuts deeper, lasts longer—with less dressing, too. Try it!

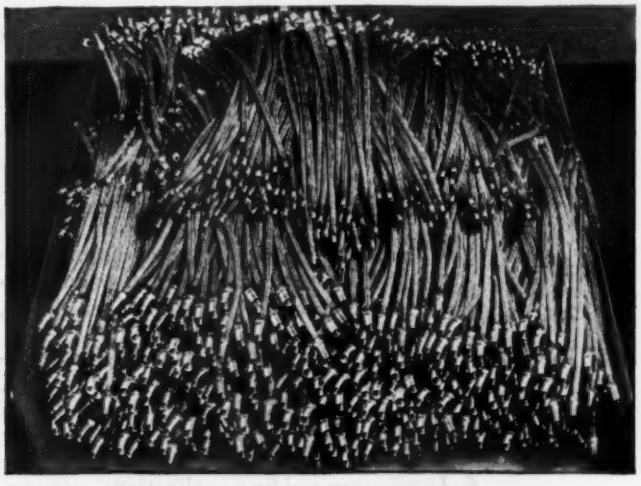


Do You Build Bulldozers, Locomotives or PT Boats?

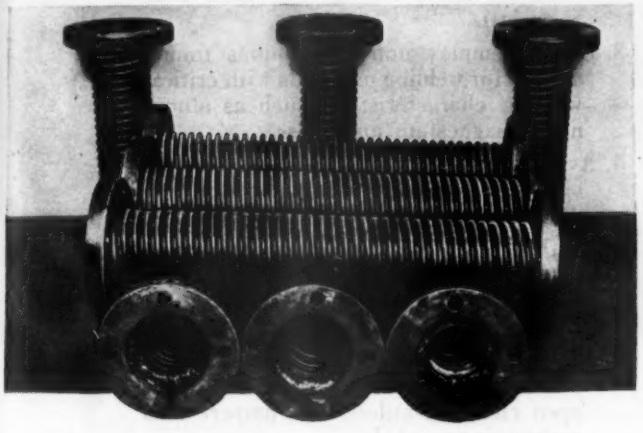
THESE TYPICAL APPLICATIONS MAY SUGGEST WHERE YOU, TOO, CAN PROFITABLY EMPLOY FLEXIBLE METAL HOSE AND TUBING



AIR STARTING LINES for locomotive diesels, involving pressures of 250 p.s.i., made of 2" I.D. bronze seamless tubing with bronze braid. Heavy duty steel flanges are Tobin Bronze welded.



HIGH-PRESSURE GREASE LINES for lubricating clutch release bearings on bulldozers and tractors, made of 3/16" I.D. TYPE M.P. steel hose, steel braid covered. Brass fittings are soldered on.



DIESEL EXHAUSTS absorb vibration, compensate for expansion and contraction. Made of 4" I.D. corrugated steel hose with welded flanges.

GAS, steam, liquid air, or grease connections which are constantly subjected to movement or vibration can cause endless grief. To make sure of top performance right from the start, use American Flexible Metal Hose or Seamless Flexible Tubing for all such connections.

"American," available in a wide range of sizes and types of construction, successfully meets almost any service requirement involving high temperatures, pressures, or severe abrasive or chemical action.

Bulletin No. SS-50, containing much useful information for manufacturers, engineers and machine designers, is yours for the asking. Write for it today.

WATER COOLED EXHAUSTS for PT boats also serve as vibration dampers to prevent line breakage. Made of 3" annular bronze seamless tubing with male fittings Tobin Bronze welded.

45263

Keep faith with your fighters and yourself! . . .

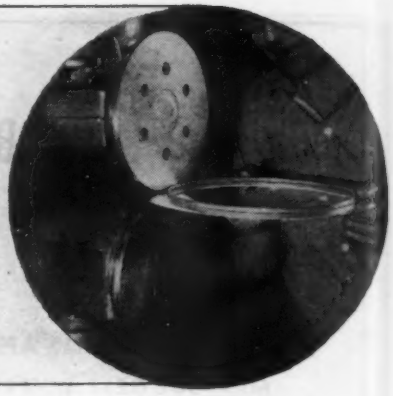
Buy War Bonds for keeps

ANACONDA

American Metal Hose

AMERICAN METAL HOSE BRANCH OF THE AMERICAN BRASS COMPANY • General Offices: Waterbury 88, Conn.
Subsidiary of Anaconda Copper Mining Company • *In Canada:* ANACONDA AMERICAN BRASS LTD., *New Toronto, Ontario*

DO'S *and* DON'TS
for
Resistance Welding Timing Equipment



Do's

1. Use suitable automatic current timing devices.
2. Use electronic or magnetic welding contactors developed specifically for welding applications.
3. Have all timing devices suitably calibrated.
4. Use synchronous electronic timing controls for short timing periods or in welding materials having critical weldability.
5. Provide suitable mounting of timing devices to protect them from vibration, abuse, excessive heat or dirt and for ready servicing.
6. In all seam welding applications, use synchronous controls, providing interrupted timing periods.
7. When using an Ignitron control with a welder drawing less than 40 amperes from the line, provide a load resistor across the primary so that the current does not fall below 40 amperes.
8. Keep all electrical contacts in relays, switches and contactors in good condition by frequent inspection and dressing, or replacement if necessary.

Don'ts

1. Avoid using slow operating magnetic contactors for a welding contactor, if you are doing precision work.
2. Never use non-synchronous timing devices for short timing (less than 4 or 5 cycles).
3. Do not employ non-synchronous timing devices for welding materials with critical welding characteristics, such as aluminum, magnesium and brass.
4. Avoid expensive synchronous timing devices for long timing, non-critical applications.
5. Don't use welding contactors or Ignitron controls, the capacity of which is not equal to the rating of the welding machine and duty cycle of the application.
6. Never operate a synchronous Ignitron control with the secondary of the welder open circuited unless a 40 ampere load resistor is provided.
7. Don't expect the timer to operate satisfactorily if the limit relay or switch in the timer-welder circuit chatters, or the contacts are oxidized or pitted.
8. Do not expect the timer to provide uniform timing pulses if the primary voltage regulation is poor (ascertain timer manufacturer's recommended limits of voltage variation).

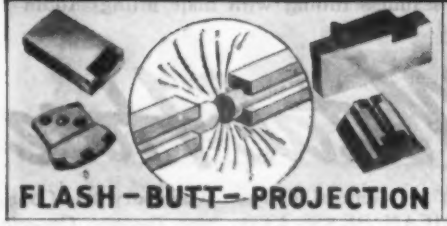
DO increase output by using Mallory Standard Resistance Welding Electrodes—spot welding tips and holders. Consult us for seam welding wheels, flash, butt and projection welding dies for your particular application. Write for your copy of the electrode catalog and the Mallory Resistance Welding Data Book, sent gratis to resistance welding engineers when requested on company letterhead.

One of a series—the entire series mailed at your request.

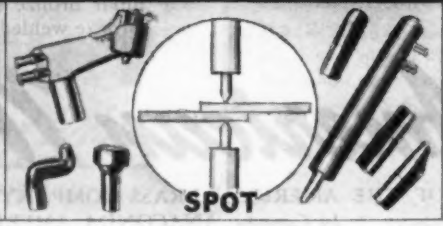
P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

P. R. MALLORY & CO. Inc

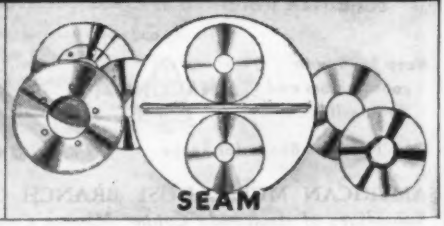
MALLORY *Standard Resistance Welding Electrodes*



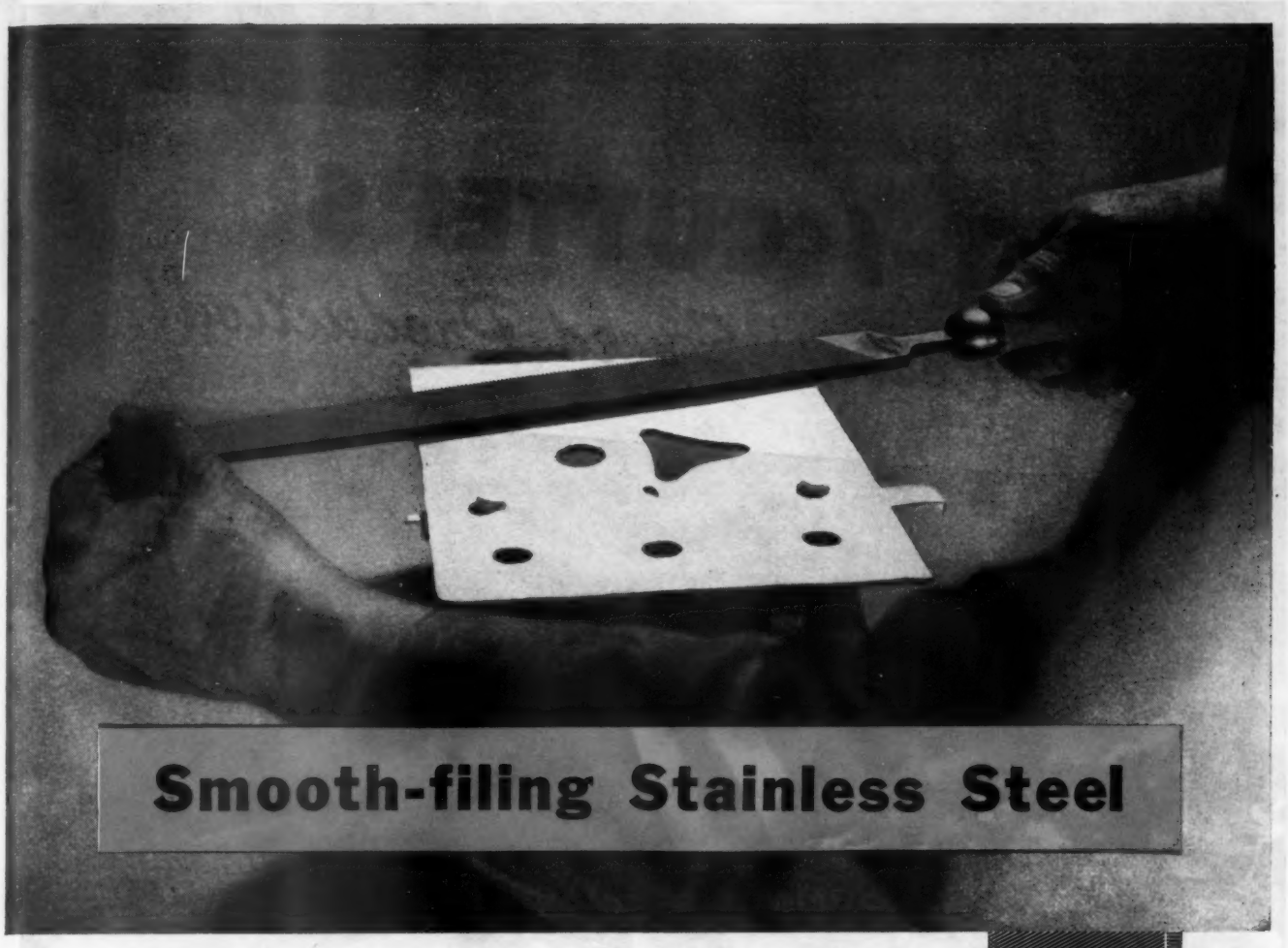
FLASH – BUTT – PROJECTION



SPOT



SEAM



Smooth-filing Stainless Steel

THE remarkable thing about filing stainless steel is that there is a file that is able to stand up at all against this hard, tough metal.

But Nicholson has done it — with a distinctive file-tooth design. This feature and great care in hardening give Nicholson Files for Stainless Steel special virtues for long-lasting efficiency despite the abrasive action of the hard chromium and nickel content they encounter.

Only light pressure is required to enable Nicholson Files for Stainless Steel to take hold, yet leave a good finish. Available, through your mill-supply house, in the same shapes, sizes and cuts as regular purpose files. Be sure your orders for these files specify "for Stainless Steel."

"FILE FILOSOPHY"—Put this interesting, profusely illustrated 48-page "handbook" on kinds, use and care of files into the hands of your key production, tool-shop and purchasing men. We've a limited supply for your judicious distribution. FREE.

NICHOLSON FILE CO. • 29 ACORN STREET, PROVIDENCE 1, RHODE ISLAND
(In Canada, Port Hope, Ont.)

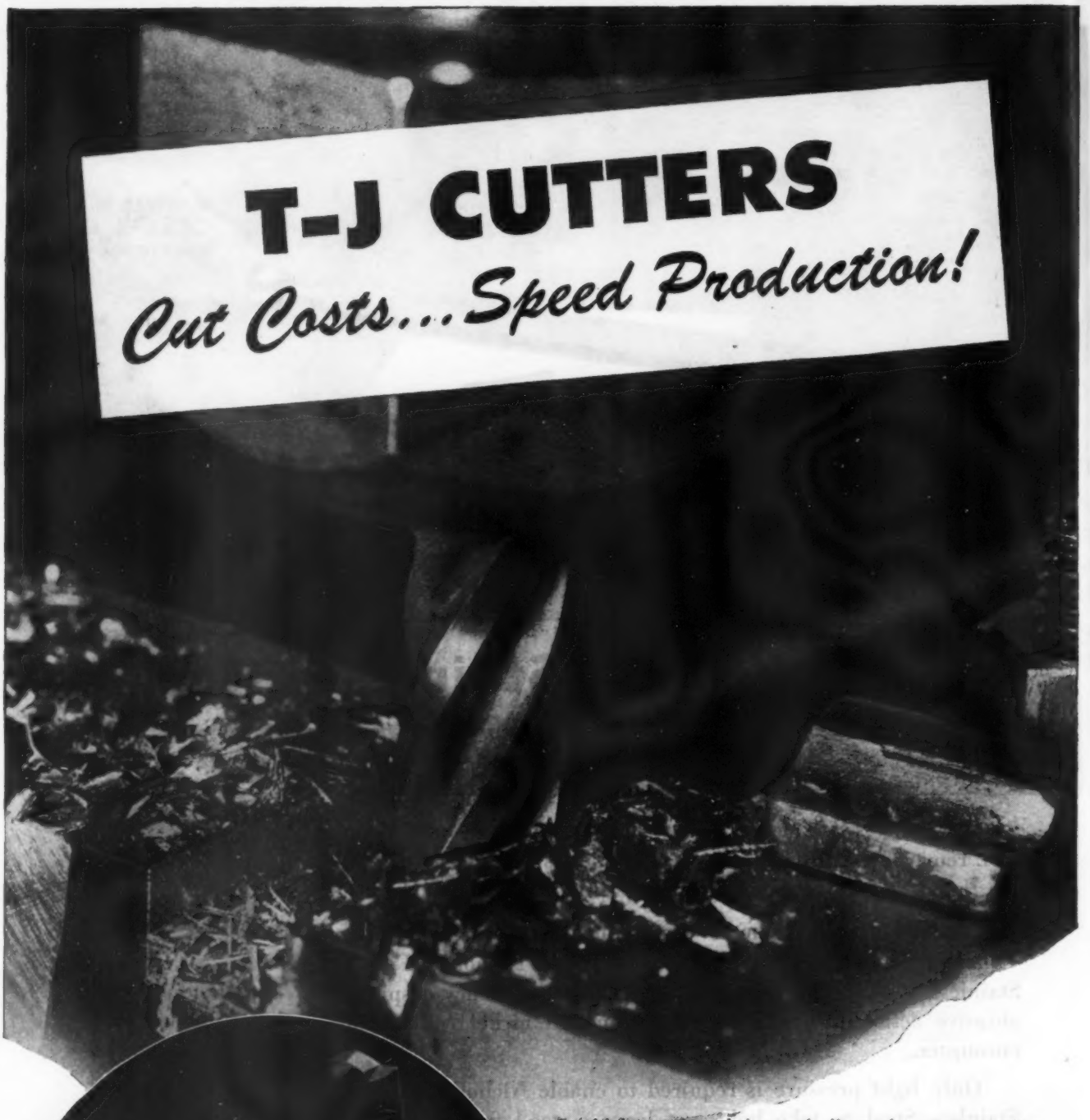
NICHOLSON FILES
FOR EVERY PURPOSE

NICHOLSON U.S.A.

• Nicholson Special File for Stainless Steel in single (Mill) cut. This and the Flat Finishing (double cut) are most commonly used for smooth-filing. For lathe work, cut is that of the Long Angle Lathe File.

T-J CUTTERS

Cut Costs... Speed Production!



For high speed work in tough die steels—or any cutting operation—you'll find T-J Die Sinking Milling Cutters unbeatable for *speed, accuracy* and *cost-cutting efficiency!*

Correctly designed . . . made from a standard, extremely high grade steel . . . properly machined . . . scientifically heat-treated and accurately ground . . . T-J Cutters do a better job with *more work between grinds!* Try T-J for easier cutting, less breakage, and a faster feed rate—with old or new machines! Many styles and sizes. Send for new catalog.

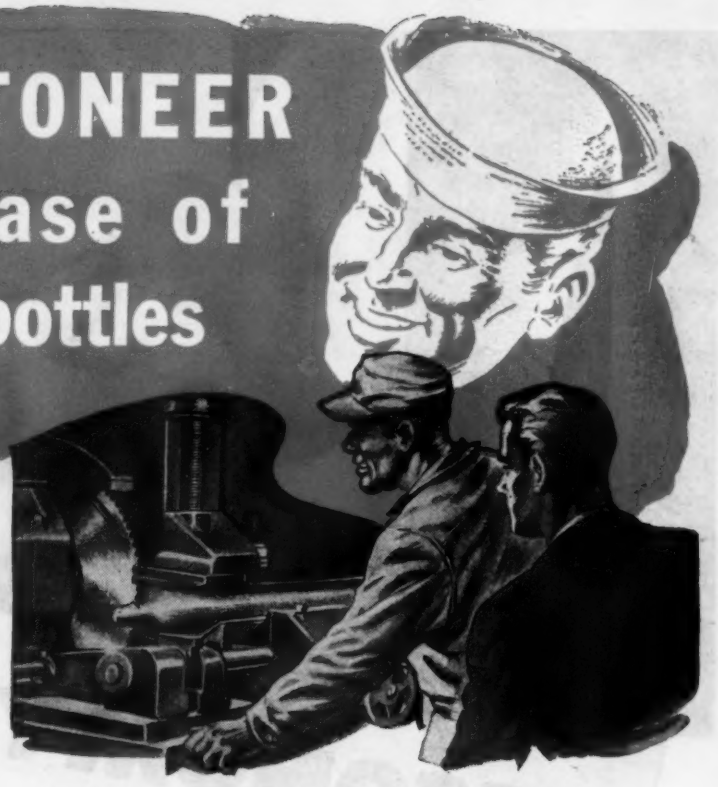
The Tomkins-Johnson Company, 601 Mechanic Street, Jackson, Michigan.

FOR TOUGH JOBS SPECIFY T-J

TOMKINS-JOHNSON

DIE SINKING MILLING CUTTERS

How a DISSTONEER solved the case of the steel gas bottles



Difficulty in cutting off the forged ends of steel, gas bottles, preliminary to drilling and tapping, was slowing up production on an important war contract. Two cut-off machines were being used, but the production schedule, which called for a cut every 90 seconds, was not being met. Saw breakage, averaging a saw a day, was a contributing factor.

The Disstoneer* who tackled the problem found that the trouble was caused by a combination of three factors: incorrect saw, wrong saw speed, and improper refitting. An Inserted-Section Saw (PATENT NO. 2,285,315) and the proper rate of feed were recommended and adopted, with this result: One cut-off machine was able to do more work than the two machines previously used . . . And the cutting schedule was kept well ahead of the operation which followed. A serious bottleneck was eliminated, and the problem solved.

***DISSTONEER**—a man who combines the experience of Disston leadership and sound engineering knowledge, to find the *right tool* for you—to cut metal, to cut wood and other materials—and TO CUT YOUR COST OF PRODUCTION—*not only on special work, but on ordinary jobs as well.*

Another clear-cut case of Disston leadership!

Your cutting problem may be different. Instead of saws it may have to do with knives. In that case you will be interested in—**DISSTON MACHINE KNIVES**

There is a Disston Knife for every purpose, and for every type of machine. Each is noted for these outstanding features: made of Special Knife Steel, carefully hardened and tempered; correct balance; fine finish; and accuracy. Many users of Disston Machine Knives report important savings in time and costs, plus increased efficiency and longer tool life. Write for full particulars.

HENRY DISSTON & SONS, INC., 520 Tacony, Philadelphia 35, Pa., U. S. A.

4

ECONOMY IN YOUR FILING OPERATIONS

4th of a series describing how "AMERICAN SWISS" Files improve filing operations.

Even the most precise or intricate filing job can be accomplished economically . . . if you select the proper file for the job from the large line of "AMERICAN SWISS" Swiss-Pattern Files.

The reasons . . . specially keen filing edges . . . extra long filing surface . . . thorough and uniform hardness . . . and every file GUARANTEED to be perfect in every respect, for "AMERICAN SWISS" sells only one quality of file . . . the best.

Users report that these high quality tools save 25% and more on their filing costs, because of the speedier work they do, the greater accuracy of filing operations which they permit, and their longer life. You are SAFE when you standardize on "AMERICAN SWISS" . . . obtainable from our supply house in your territory. Write for catalog.

AMERICAN SWISS FILE & TOOL CO., ELIZABETH 1, N. J.

ASK FOR THEM BY NAME

American Swiss

SWISS PATTERN FILES

Vital to the World's Finest Electrical Equipment

EVERY major maker of electrical equipment for industrial and for home use regularly specifies and uses Standard Shield Brand Drills, Reamers, Taps, Dies and Cutters. This industry is among our largest customers.

Electrical equipment built with the aid of Standard Shield Brand Tools is contributing to the efficiency and economy of work in factories and homes throughout America.

Wherever accuracy, speed and uninterrupted production are required, you will find Shield Brand Tools specified by tool engineers. If you have a tough problem in drilling, reaming, tapping, threading, or machining small parts, let us examine it. Our experience may suggest a money-saving or time-saving answer. No obligation, of course. Write

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TWIST DRILLS
REAMERS
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SPECIAL TOOLS

THE STANDARD TOOL CO.

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STANDARDIZE
A Profit Principle

TO Standardize your product, so far as possible—making only the most wanted grades, sizes and designs, is generally accepted as a good principle. It permits line manufacture, eliminates the necessity of more costly job shop methods, and thus increases profits.

Have you considered how far Standardization may be carried profitably?

For example—many manufacturers Standardize on Shield Brand metal cutting tools—drills, reamers, cutters, taps, and dies. These classes of tools, all made in one plant, are manufactured under the same laboratory control of materials, the same highly trained supervision, the same rigid standard of inspection.

Result, they are uniform in economical performance. Your mechanics will like them—their use will aid you in Standardizing your own manufacturing program.

Leading mill supply dealers from coast to coast will fill your requirements. Specify Standard Shield Brand Drills, Reamers, Cutters, Taps and Dies for maximum economy in metal cutting operations.

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...they're all MO-MAX

Every one of the **molybdenum-tungsten** high speed steels listed below is made according to a genuine MO-MAX formula. To insure top performance in all types of cutting tools, specify one of these MO-MAX steels.

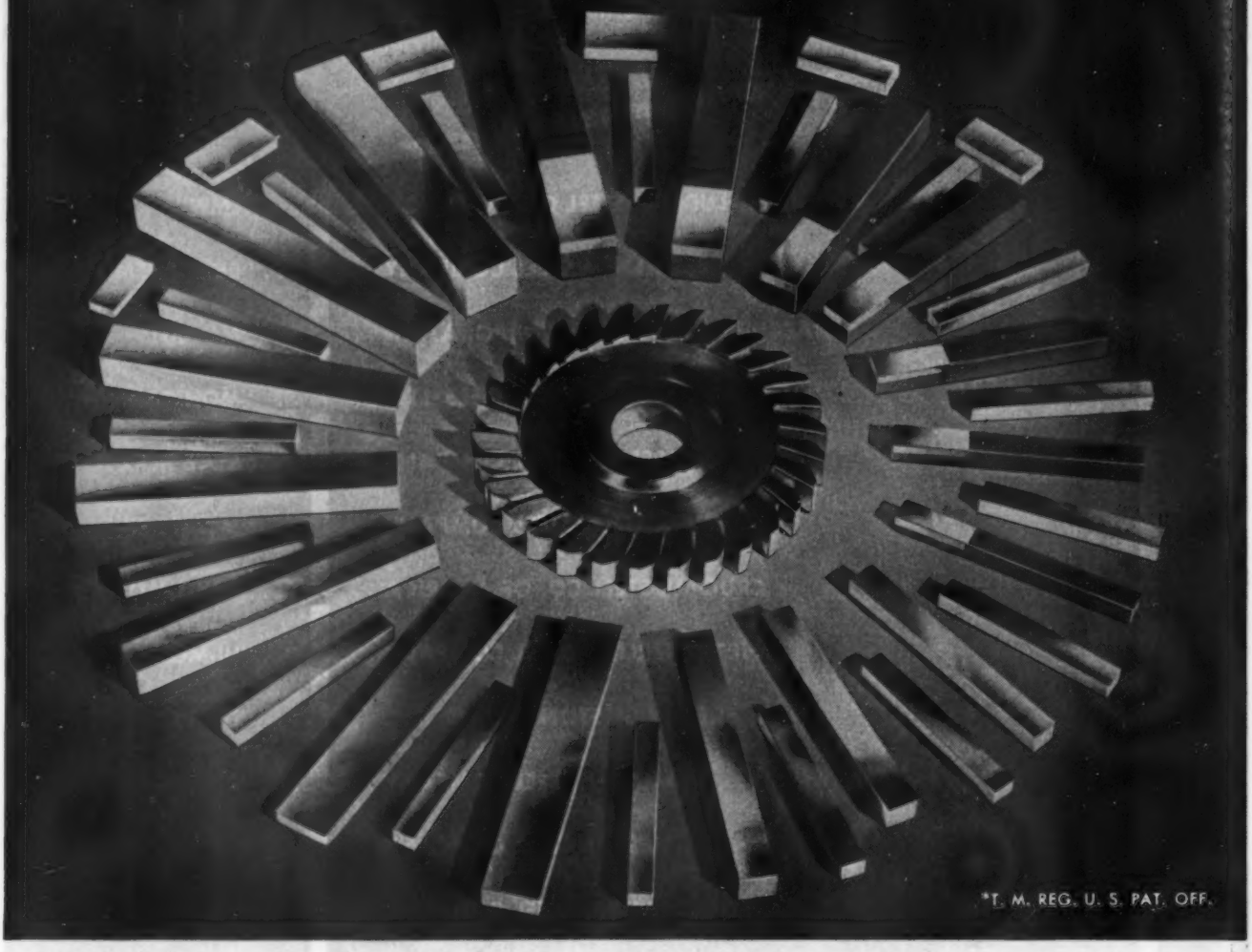
ALLEGHENY LUDLUM STEEL CORPORATION	"LMW"
BETHLEHEM STEEL COMPANY	"BETHLEHEM HM"
BRAEBURN ALLOY STEEL CORPORATION	"MO-CUT"
CANADIAN ATLAS STEELS, LTD.	"MOHICAN"
CARPENTER STEEL COMPANY	"STAR MAX"
COLUMBIA TOOL STEEL COMPANY	"MOLITE 8"
CRUCIBLE STEEL CO. OF AMERICA	"REX T-MO"
FIRTH-STERLING STEEL COMPANY	"HI-MO"
HENRY DISSTON & SONS, INC.	"DI-MOL"
HALCOMB STEEL COMPANY	"REX T-MO"
JESSOP STEEL COMPANY	"MOGUL"
LATROBE ELECTRIC STEEL COMPANY	"TATMO"
SIMONDS SAW & STEEL COMPANY	"S. T. M."
UNIVERSAL-CYCLOPS STEEL CORPORATION	"MO-TUNG"
VANADIUM-ALLOYS STEEL COMPANY	"8-N-2"
VULCAN CRUCIBLE STEEL COMPANY	"VUL-MO"

For the full story on MO-MAX **molybdenum-tungsten** high speed steels—their physical properties, their advantages, and how to heat treat them—write today to Department C for the new 1945 MO-MAX Handbook.

THE CLEVELAND TWIST DRILL CO. • 1244 EAST 49th ST. • DEPT. C • CLEVELAND 14, OHIO

BORCOLOY*

FAST CUTTING FERROUS TOOLS



*T. M. REG. U. S. PAT. OFF.

Announcing

THE CENTRIFUGALLY CAST BORON COBALT ALLOY

• FOR "MIDDLE-RANGE" MACHINING OPERATIONS

Extensive research in the field of cutting alloys has resulted in the centrifugally cast ferrous alloy that incorporates the superior Hardness of heat treated steel (Rockwell up to C-71) with the "Red Hardness" of Cobalt, and the "Wear and Abrasion Resistance" of Boron.

Tools of BORCOLOY cut tough and heat treated materials with feeds and speeds greater than those ordinarily obtained on "bottle-neck" production jobs —particularly so on the special aircraft and ordnance materials that present such a challenge today.

In order to meet these grueling demands with maximum efficiency, may we suggest you try BORCOLOY TOOLS under your most unfavorable conditions, and let their ability speak for themselves to remove more metal faster, with finer finish, at less cost per unit.

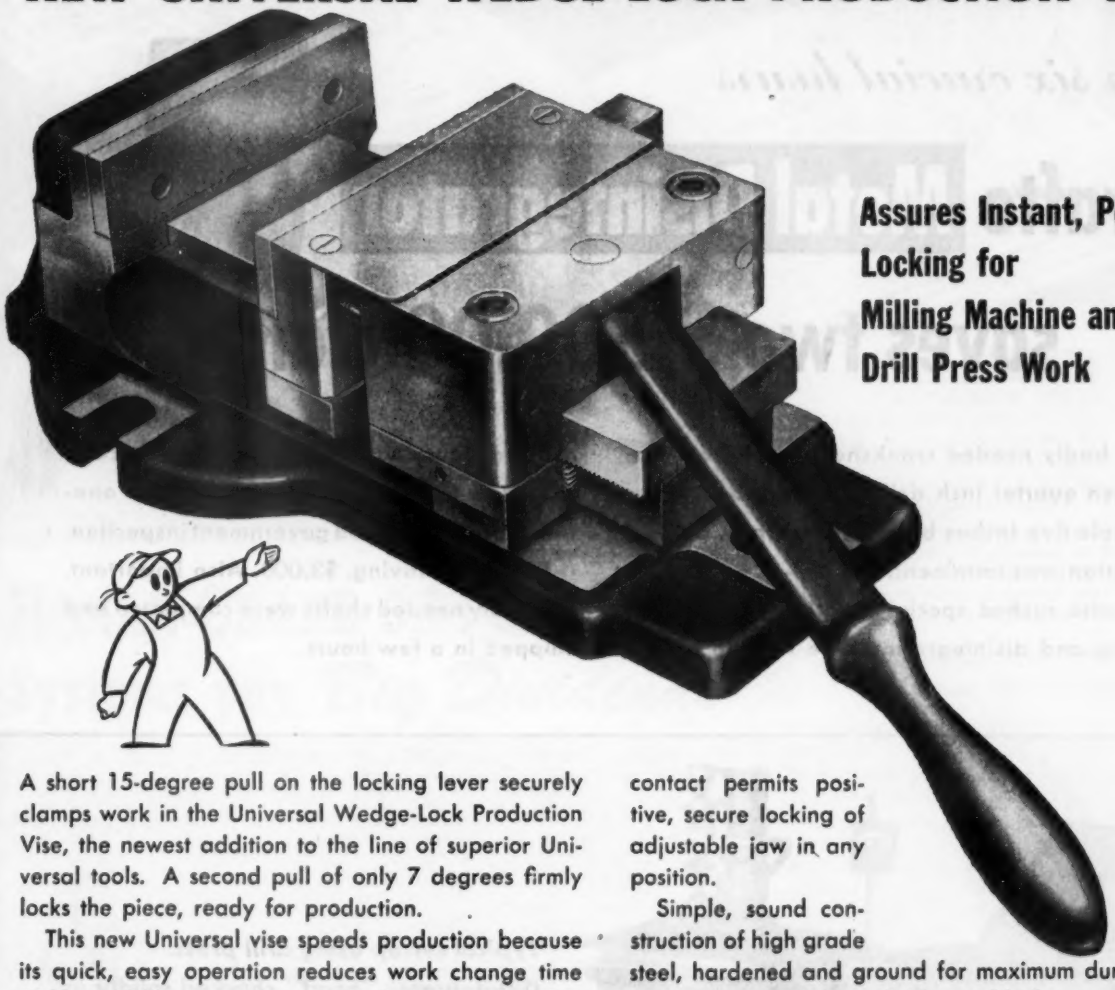
GENERAL AIRCRAFT EQUIPMENT, INC.

Tool Division: South Norwalk, Conn.

Branch Offices: Newark Detroit Los Angeles

Canadian Sales: General Aircraft Equipment of Canada Ltd., Montreal, P.Q.

NEW UNIVERSAL WEDGE-LOCK PRODUCTION VISE



Assures Instant, Positive Locking for Milling Machine and Drill Press Work

A short 15-degree pull on the locking lever securely clamps work in the Universal Wedge-Lock Production Vise, the newest addition to the line of superior Universal tools. A second pull of only 7 degrees firmly locks the piece, ready for production.

This new Universal vise speeds production because its quick, easy operation reduces work change time 10% to 80%. Pressure is applied to the adjustable jaw through taper wedges so that the work is clamped smoothly, with no fatigue to operator. Splined roller contact permits positive, secure locking of adjustable jaw in any position.

Simple, sound construction of high grade steel, hardened and ground for maximum durability, assures years of dependable trouble-free service for users of Wedge-Lock Production Vises. Write for complete information.

UNIVERSAL TOOLS THAT WILL INCREASE PRODUCTION AND ACCURACY IN YOUR PLANT

UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH, MICHIGAN — Fighter Plane Given by Employees — 20% Employee Bond Deductions

In six crucial hours

Drafto Metal Disintegrator saves two $1500.00 crankshafts

Two badly needed crankshafts each had a broken quarter inch drill embedded in an oil hole five inches below the surface. Cancellation was imminent.

Drafto rushed special length electrodes. Set-up and disintegration time for the first drill was four and one-half hours. The second drill was disintegrated in an hour and one-half. Both jobs passed government inspection.

Estimated saving, $3,000. Also important, the badly needed shafts were completed and shipped in a few hours.

Typical set-up using drill press. Disintegrator "head" chucked solidly in locked press; work piece clamped firmly to table. Disintegrator may be set up to operate at any angle. "Head" does not rotate.

THE Drafto Metal Disintegrator is a compact, portable, self-contained unit designed to save dies and work pieces you formerly scrapped because of embedded tools. It disintegrates metal through the action of a rapidly vibrating electric arc, without excess heat or pressure.

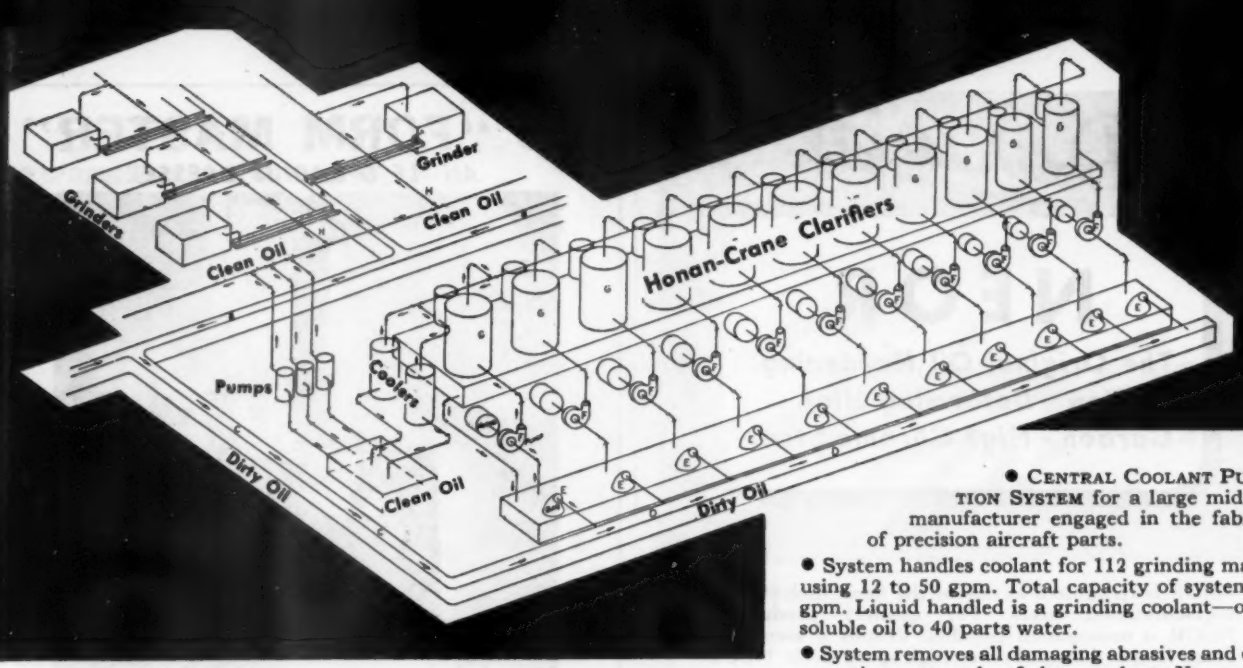
Broken taps are removed by disintegrating the core. You take out broken drills by disintegrating the web. Studs and hardened pins are removed by disintegrating odd shaped holes.

Finished surfaces, hardness of metal, and delicate contours are not affected, for disintegration takes place only where the electrode touches.

Drafto Metal Disintegrator requires no lengthy training period. It comes to you complete, ready to go to work, with its self-contained coolant tank and pump, and a supply of electrodes for $295. Manufactured by Drafto Corporation, Cochranton, Pa. Representatives in key cities.

WRITE, WIRE OR PHONE FOR BULLETINS AND DETAILS • Address Inquiries to Dept. AM

WALTER J. GREENLEAF *Company*
NATIONAL DISTRIBUTORS
Pittsburgh 21, Pennsylvania



• CENTRAL COOLANT PURIFICATION SYSTEM for a large midwestern manufacturer engaged in the fabrication of precision aircraft parts.

• System handles coolant for 112 grinding machines, using 12 to 50 gpm. Total capacity of system, 3,000 gpm. Liquid handled is a grinding coolant—one part soluble oil to 40 parts water.

• System removes all damaging abrasives and delivers a continuous supply of clean coolant. *No coolant is reused without being purified.* Used coolant flows in trenches to central system and is returned to individual machines through overhead pipe lines.

In operation over two years, the System shows these benefits:

• Saves 192 man-hours per day in servicing individual machines.

• Machines can operate 24 hours per day, giving increased production.

• Coolers can be used to control temperature of coolant.

• Clean coolant means better finish, fewer rejects; extends tool life, prevents loading of stones and removes principal cause of dermatitis.

HONAN-CRANE Oil Purification Systems pay *Big Dividends*

• Proper purification of industrial oils *can show as much as 20% increase in overall efficiency of machine tool operations.* Engineers and operators have learned that a continuous supply of "Clean Oil" to grinding, cutting and boring machines increases efficiency and greatly reduces maintenance costs. . . . That's why no engineer or plant manager can afford to ignore the proper purification of oils used in his plant. The following case histories present details of two established Honan-Crane installations.

Write today for Equipment Data on Honan-Crane "Continuous" Purification of all kinds of Industrial Oils.

HONAN-CRANE CORP.
Subsidiary of Houdaille-Hershey Corp.
205 Wabash Ave.
LEBANON, INDIANA

• CENTRAL PURIFICATION SYSTEM for a large producer of quartz crystals. (*See diagram below*)

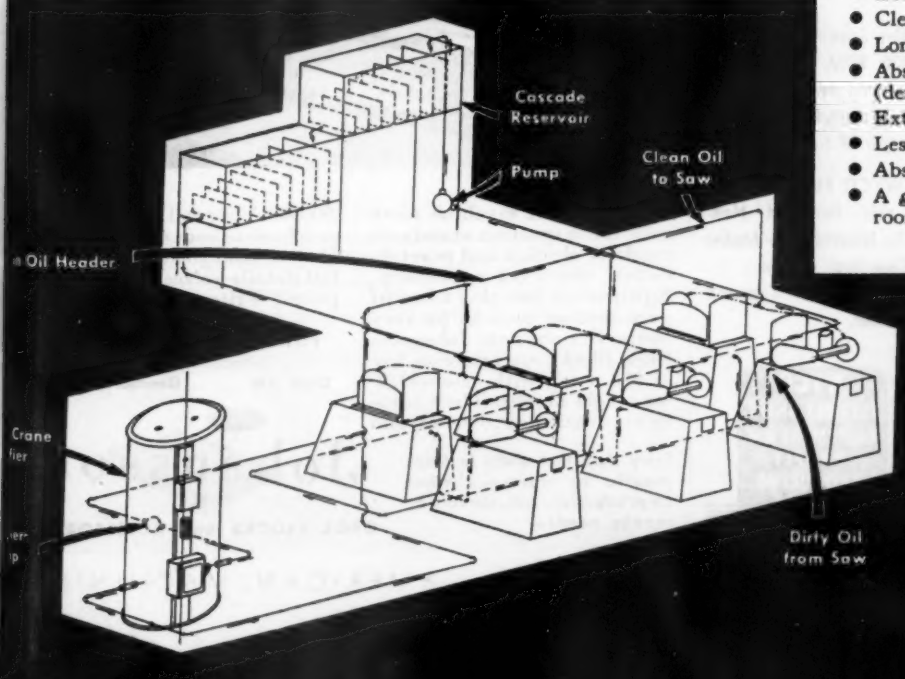
• System handles oil used for lubricating and cooling saw blades in quartz.

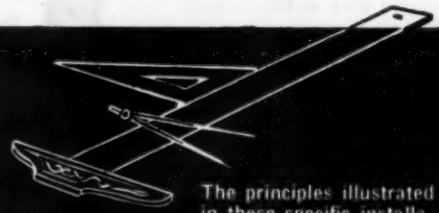
• Liquid handled is pure mineral oil.

• Oil from individual saws is piped to cascade reservoir, thence to Honan-Crane Purifier, and returns through overhead trunk and branch lines. *No oil is reused without purification.*

In operation over a year, the System shows these benefits:

• Longer saw blade life.
• Cleaner cut.
• Longer bearing and machine life.
• Absolutely no outbreaks of skin infections (dermatitis).
• Extremely low oil cost.
• Less oil in the air.
• Absence of objectionable odors.
• A *general efficiency rise of about 20%* in saw room operation.





The principles illustrated in these specific installations can be successfully applied to your problem of removing abrasives and contamination from industrial oils used in similar operations.

Darwin

NEOR

The Original Oil Hardening, Non - Deforming High Carbon - High Chrome Steel

NEOR is recognized as one of the finest high-carbon, high-chromium steels. For quantity production, NEOR is unsurpassed for dies. Retains a keen edge much longer than carbon or high speed steels. NEOR hardening penetrates to the center of the tool and is non-deforming.

Owing to its remarkable resistance to abrasion, NEOR is ideal for gages.

Furnished in Billets, Bar Stock and Drill Rod.

Bulletin on Request.

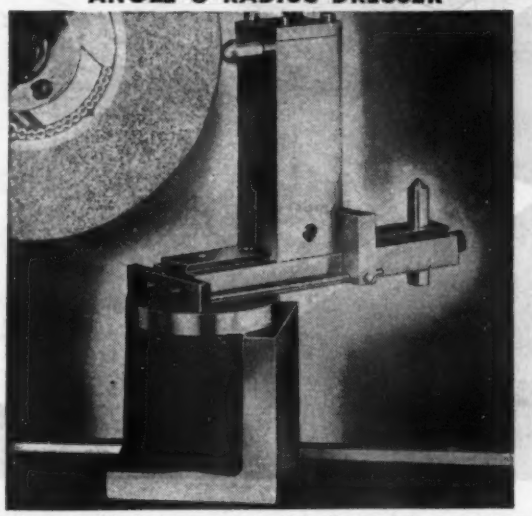
DARWIN & MILNER Inc.

highest grade tool steels

1260 W. FOURTH ST. **CLEVELAND 13, OHIO**

The "FORM MASTER"

ANGLE & RADIUS DRESSER



A sturdy, quality instrument designed by form-grinding specialists to dress BOTH angles and radius at low cost. Two 1/3 ct. diamonds and case included—$150.00 complete.

Features

Large range	.0001" accuracy obtainable
Chatterless	Simple to operate
Dustproof	Reasonably priced

Call your supplier or write

J. & S. TOOL CO. 477 Main Street E. ORANGE 1, N. J.

YOU ARE SURE of the Best When You Select from the WYCO CATALOG

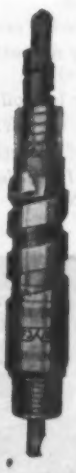
There *is* a right machine for every job—WYCO Flexible Shaft Equipment includes a complete range of machines to meet every production requirement . . . with mountings to suit every working condition.

WYCO Flexible Shaft Machines have won national recognition for successful performance on the toughest jobs for war production . . . have set *new records* for longer shaft life and greater production per unit of power!

Send for our Catalog today.

WYZENBEEK & STAFF, INC.

630 W. Hubbard St., Chicago 22, Ill.



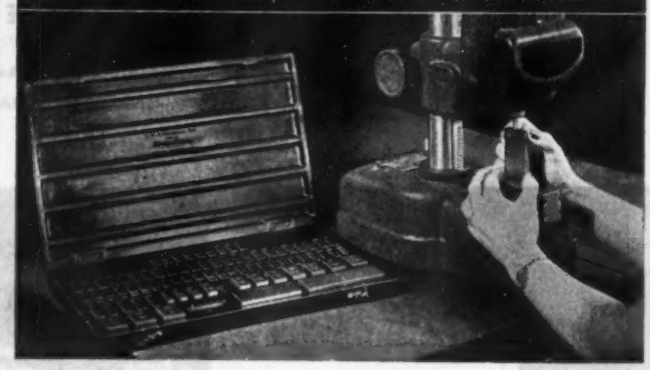
MODEL 53-A

Selective Speeds 1800, 3600 or 6000 RPM. 1½ HP 3-phase motor and 7 ft. Shaft. Note low center of gravity—no danger of tipping over.

Only WYCO Flexible Shafts have this Patented Non-Metallic Innerliner — Makes the Core last longer . . . Run smoother . . . Transmit more power.

WYCO FLEXIBLE SHAFT EQUIPMENT and PROFIT PRODUCING TOOLS

Wherever accuracy is important... so is accuracy CONTROL!



● Close-limit machine work calls for inspection standards regularly checked and re-established wherever necessary. Equipment for this kind of gage-testing used to be very costly. But not now. Johansson Gage Blocks are priced as low as $23 a set, with case—$3.50 for single blocks. They come in accuracies of .000004 and .000008. They will put your shop on a basis of enduring accuracy. May we send you a catalog with full details—sizes, accessories, prices? Write today.

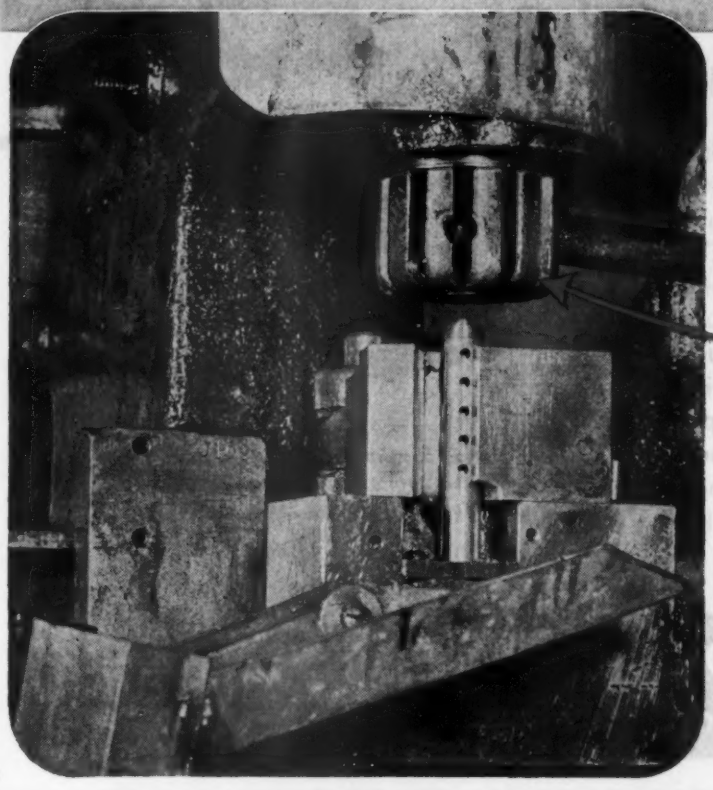
FORD MOTOR COMPANY
Johansson Division
Dept. AM Dearborn, Mich.

Every shop that works to thousandths or closer—whether on production, adjustments or repairs, needs—

Johansson

GAGE BLOCKS and ACCESSORIES

"HARDSTEEL"



Spinning Dies

Spin Ends Shut on Fuse Cases at the Rate of 720 Per Hour

The special properties of "HARDSTEEL"—extreme resistance to wear and heat—are used to good advantage in the high-speed production of fuse cases for artillery and anti-aircraft ammunition. Cases are made of Admiralty bronze tubing, .544" O. D. x .451" I. D. The operation is spinning one end completely shut on a .272" outside radius. This is done on a standard vertical spinning machine at 2000 R. P. M. spindle speed. Case is held by an air-operated holding fixture. No lubricant is used on die or work. Floor-to-floor time is 5 seconds per piece—2 seconds for spinning and 3 seconds for loading and unloading by hand.

The "HARDSTEEL" die averages 48 hours between grinds—regrinding taking about 3 hours. Dies can be ground 15 times before becoming too thin.

"HARDSTEEL" Drills, Tool Bits and Special Tools are solving many other production problems—among them the drilling of hardened steels and the machining of tough hard steels and abrasive non-ferrous alloys. Also inquire about "HARDSTEEL" as a metal for special parts that must meet unusual conditions of service.

LEARN TO DRILL HARDENED STEELS WITHOUT ANNEALING

The "HARDSTEEL" Operators' Manual is free. Write for your copy today.

"HARDSTEEL"

DRILLS • TOOL BITS • SPECIALS

BLACK DRILL CO. • Division of Black Industries • 144 E. 222nd St., Cleveland 17, Ohio

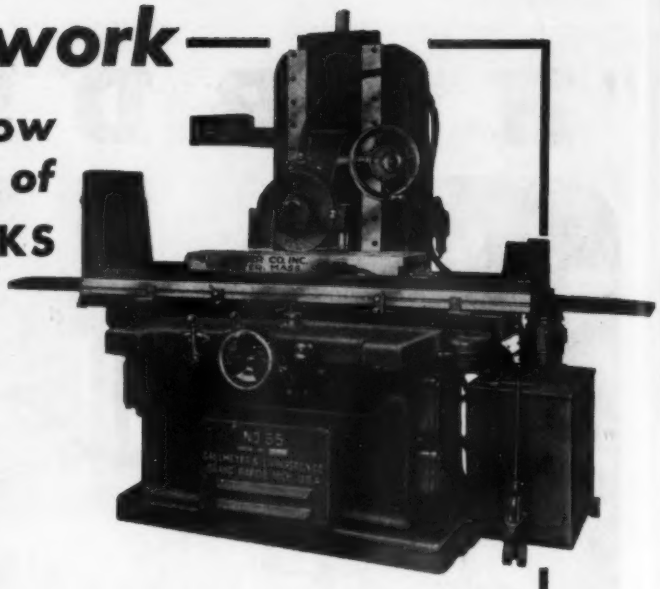
Other Divisions: Black Boring and Machine Co. Maryland Division

"WALKERS" at work—

High machine efficiency and low production cost dictate the use of

WALKER MAGNETIC CHUCKS

Accurate work performed on Precision Machines requires the most effective holding means for the operations involved. That is why so many machine tool builders have accepted WALKER MAGNETIC CHUCKS and recommend their use for dependable, accurate service and for simplifying set-ups. The WALKER line includes Electro-Magnetic chucks of improved design as well as plain and swivel units of the Permanent Magnetic type. It will pay you to consult your Machine Tool Builder whose engineers in collaboration with "Walker" will help you achieve maximum machine efficiency and low production cost.



No. 55 Grand Rapids Hydraulic Feed Surface Grinder with 12"x36" Walker Magnetic Chuck mounted on table.

One of a series of advertisements showing specific machines on which Walker Magnetic Chuck are being used.

O. S. WALKER CO., Inc.
100 Rockdale St., Worcester 6, Mass.

SELECT THE RIGHT WHEEL

AND SAVINGS WILL FOLLOW

Vitrified makes it possible to standardize on grinding wheels by offering a wide range of standard types which cover practically all wheels used on standard makes of grinding machines.

Selection of the right wheel for the work to be handled is simplified in the Vitrified catalog—a 65-page booklet which gives specific data, dimensions, etc., covering the entire Vitrified line.

Send for this catalog. Choose a grinding operation in your shop on which you would like to cut costs. Select the Vitrified wheel which meets your specifications, try it out, and compare results with the method formerly used—and you, too, will join the long list of progressive manufacturers who have standardized on Vitrified.

Write for the catalog today

VITRIFIED

VITRIFIED WHEEL COMPANY
WESTFIELD MASS.

"Bumblebee" performance

New 200 Ampere "Bumblebee"

WHATEVER your welding problem — on production lines, or special jobs — there's a Wilson "Bumblebee" A.C. Arc Welder that's just suited to your needs . . . designed to do the work faster, better, with lower power consumption.

"Bumblebees" are now made in five sizes, all embodying characteristic "Bumblebee" efficiency, economy and dependability: (1) The new 200 ampere "Bumblebee" for light, odd-job or production welding; (2) the 300 ampere, and (3) the 500 ampere "Bumblebee" for heavy all-purpose assignments; and (4 and 5) the 750 and 1000 ampere sizes available on special order. The 300 and 500 ampere sizes are available in "All-Weather" models for welding under conditions where excessive moisture is encountered.

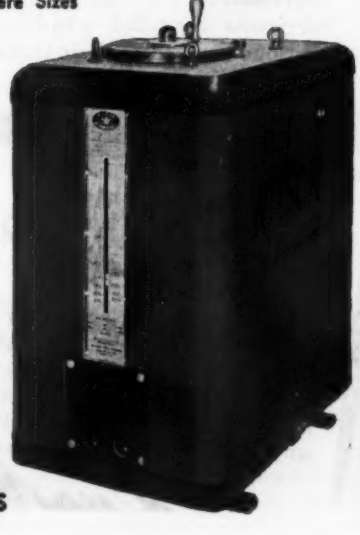
Throughout industry the many important features of the "Bumblebee" have made them a widespread choice among owners and operators. With their deep penetrating arc and excellent arc characteristics, they permit more welding production per work day — of better quality, with considerably lower power costs.

Light, well balanced, rugged, they provide continuous, step-less current control, from maximum to minimum—simply by turning a crank on top. All "live" parts are completely shielded and protected.

• See your nearest Airco office for full information or write Dept. AM for catalog. Address Air Reduction, General Offices: 60 East 42nd Street, New York 17, N.Y. In Texas, Magnolia Airco Gas Products Co., General Offices: Houston 1, Texas.

All-Weather Model

300 and 500 Ampere Sizes



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Offices in all Principal Cities

AIRCO

WILSON

"Bumblebee" A.C. ARC WELDERS

with the penetrating, stinging arc

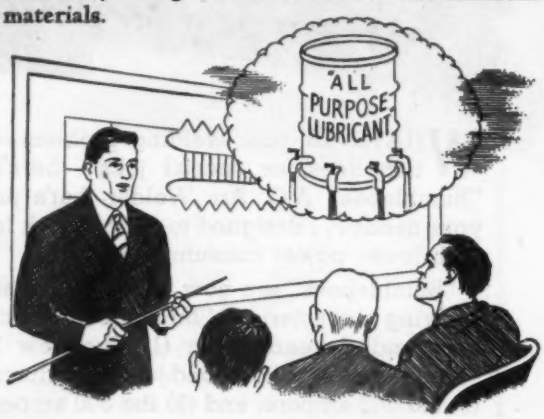
A COMPLETE LINE OF A.C., D.C. AND GAS-ENGINE DRIVEN UNITS

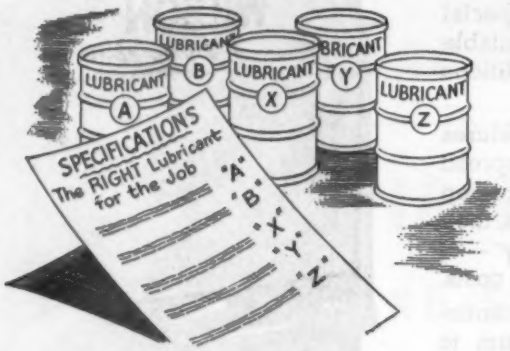
"SHOW-HOW" TALK BY "GREENFIELD MAN" RESULTS IN IMPROVED TAPPING IN MODERN PLANT

[A GTD SHOW-HOW REPORT]

1 It was in one of those modern up-to-the-minute plants. They had a foreman education course at which talks were given by outside experts on materials, methods and equipment. The "Greenfield Man" was asked, through the local distributor, to talk on thread cutting. Before the meeting, the superintendent showed him through the plant. It was a beauty. He carefully inspected all the threading operations.

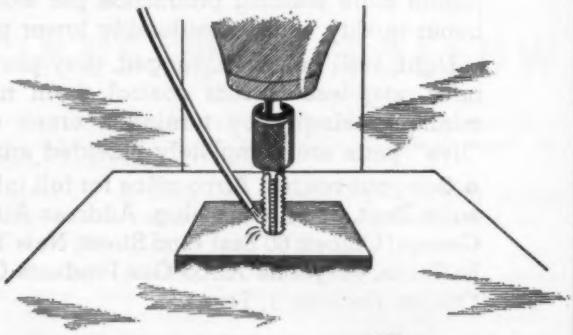
2 After the general talk on thread cutting as applied to their operations, one foreman asked for specific ideas for improving their threading results. The "Greenfield Man" pointed out that he noticed they were using only one type of lubricant for all threading jobs, suggested that they could get better results by using selected lubricants for different materials.





3 The "Greenfield Man" explained how selected lubricants could increase speeds and reduce tap wear and breakage. He cited examples. He discussed specific operations in their own plant. The foremen were impressed. At his suggestion, the plant's supplier of lubricants was called in to draw up complete specifications for each of their threading operations.

4 Almost immediately this modern plant was able to show a substantial improvement in threading production as a result of this visit by the "Greenfield Man." They now had the *right* lubricant for each job. No new tools or equipment had been involved. It was simply applying the "Greenfield Man's" wide experience with tapping problems to conditions in this plant.



Are You Using "GREENFIELD" SHOW-HOW Literature?

For example, this folder on "Lubricating Taps Right." Here is valuable information for your employees. Order a supply from your "Greenfield" distributor today. And, if you need help on a threading problem, call on the "Greenfield Man" through your "Greenfield" distributor.

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ONE-PASS INSPECTION

Workpiece is passed *directly* under contact. No stopping and no backstop required. 30 to 60% faster inspection, accurately.

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Limit lights show immediately any variation in specified dimension. No hesitation, no backstop, positive.

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This Comparator is of great value for fast, 100% inspection at either Production or Final Inspection. The speed is unusual. There is no necessity for slowly maneuvering the workpiece under the sensitive contact to determine its maximum dimension, nor to bring it to rest against a backstop. Actual time studies indicate savings in inspection time of from 40% to 60%.

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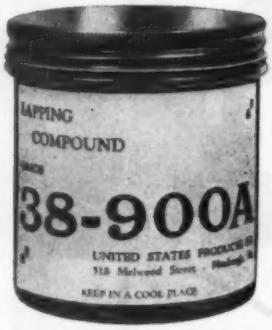

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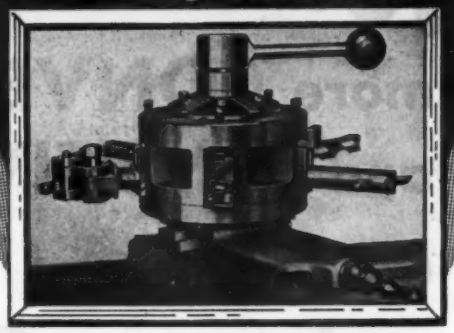
PORTRAIT *of* A TIMESAVER



5 STATION LATHE TURRETS ARE VITAL TO PRODUCTION

SAVE TIME

1 JUST A TURN AND A LIFT OF THE HANDLE BRINGS ONE OF FIVE TOOLS IN POSITION

2 THIS, WITH TEN ACCURATE INDEXED TOOL POSITIONS ALLOWS MINUTE ADJUSTMENTS

Time saved brings VICTORY that much nearer. Our NEW IMPROVED TURRET HEADS are built to take heavy cuts, and give precision service. Inexperienced help can quickly become fast operators with these NEW IMPROVED TURRET HEADS.

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Model No. 1 for taps up to 6" long
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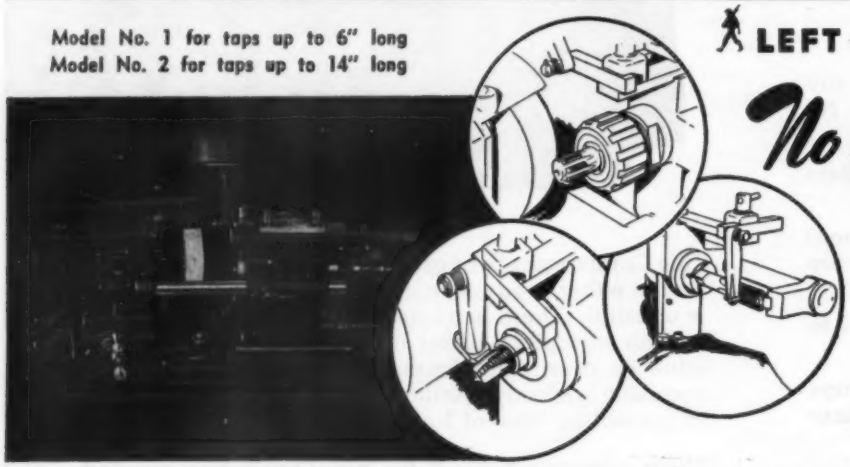

LEFT-RIGHT LEFT-RIGHT

No matter-

WHAT THE HAND OF THE TAP YOU CAN GRIND IT FASTER AND CHEAPER ON A BLAKE TAP GRINDER

The fact that you can sharpen left- or right-hand taps on any Blake Tap Grinder (without changing over the machine) is a definite production and cost-saving feature. All the operator need do in changing from one type to another is to set one dial and turn the locating finger—it's as simple as that!

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It has long been the privilege of The Pipe Machinery Company to work closely with suppliers of API products.

PM Gages are today helping these manufacturers maintain the high standards of precision dictated by the need for joints that are both *strong* and *tight*.

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Because the Petroleum Industry talks about "pipe," few realize that its standards for precision threading are the most rigid of all large industries. Unusual co-operation between user and producer for 20 years has maintained these exceptionally high standards without sacrifice of economy in production. API (American Petroleum Institute) standards are real standards that set a pattern for all industries.

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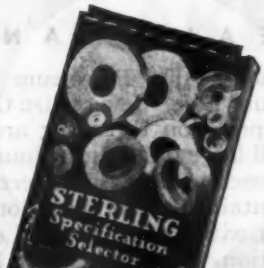
Give new life to your schedules by placing on your machines these wheels that have been built to new standards of perfection and performance.

Sterling's Specification Selector will help you find the correct wheel for hundreds of wartime jobs.

Send for this valuable, pocket-sized production aid today.



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THE
STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY

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ABRASIVE Borolon and Electrolon Grinding Wheels run true and smooth without strain or chatter because exactness is basic in Abrasive Company manufacture. Typical of the accuracy maintained in every phase of production are the tests which check grinding wheels for concentricity and parallelism. To obtain running balance necessary for accurate grinding, bores must be exactly centered in true circular wheels of uniform thickness. From the selection of raw materials, and the manufacture of abrasive grains on through every stage of production, constant laboratory control with countless scientific tests and inspections govern Abrasive Company quality.

The illustration shows how Abrasive Company Grinding Wheels are "truth tested" with micrometer gauges on face and sides for concentricity and parallelism.

There is a Borolon (aluminum oxide) or Electrolon (silicon carbide) grinding wheel, mounted point or wheel to meet the selective service requirements for grinding, cutting, snagging and finishing every type of material. Abrasive Company distributors carry a wide variety of wheels and can be helpful in recommending grains, grades and bonds to produce the best results for specific grinding jobs.

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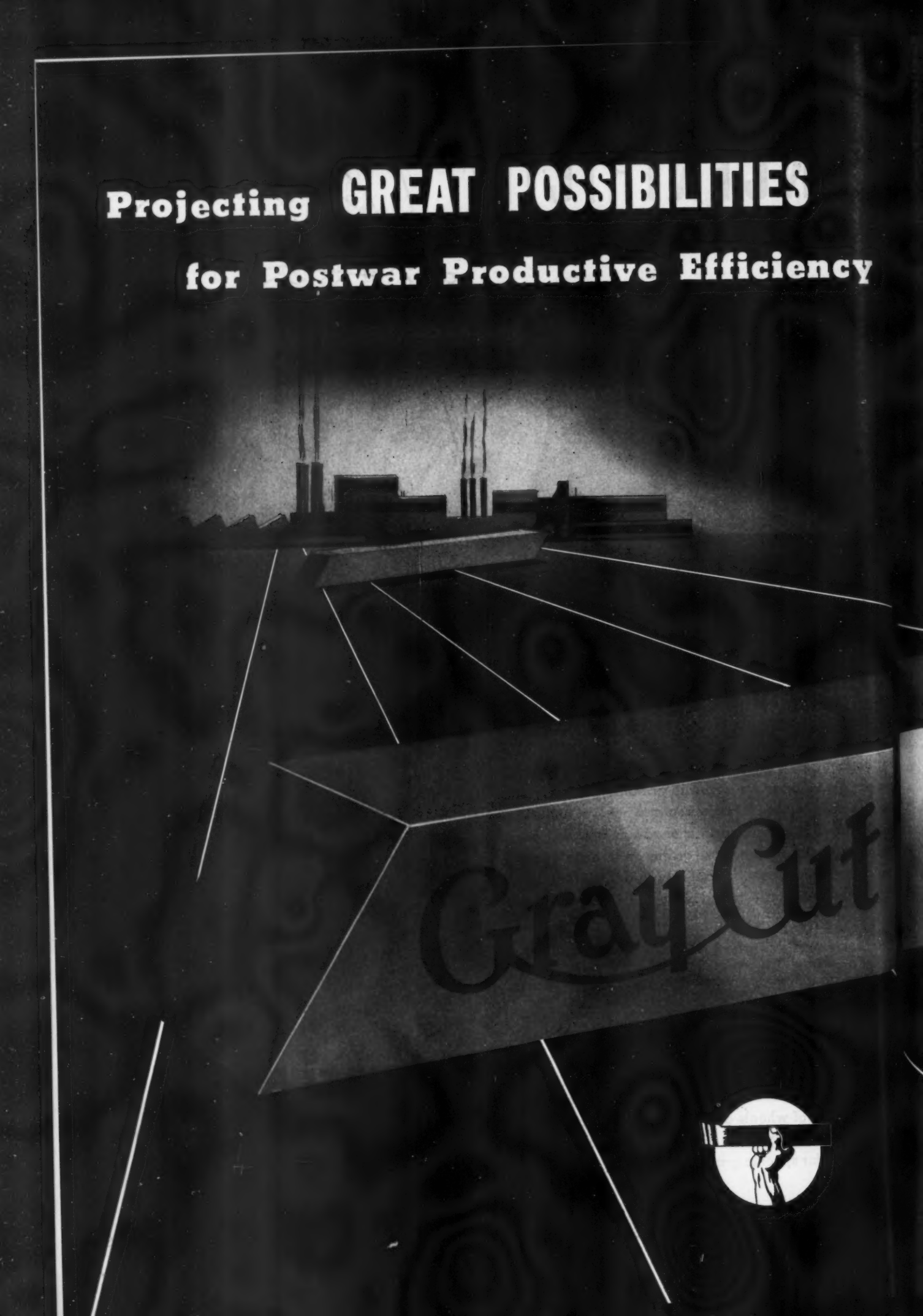
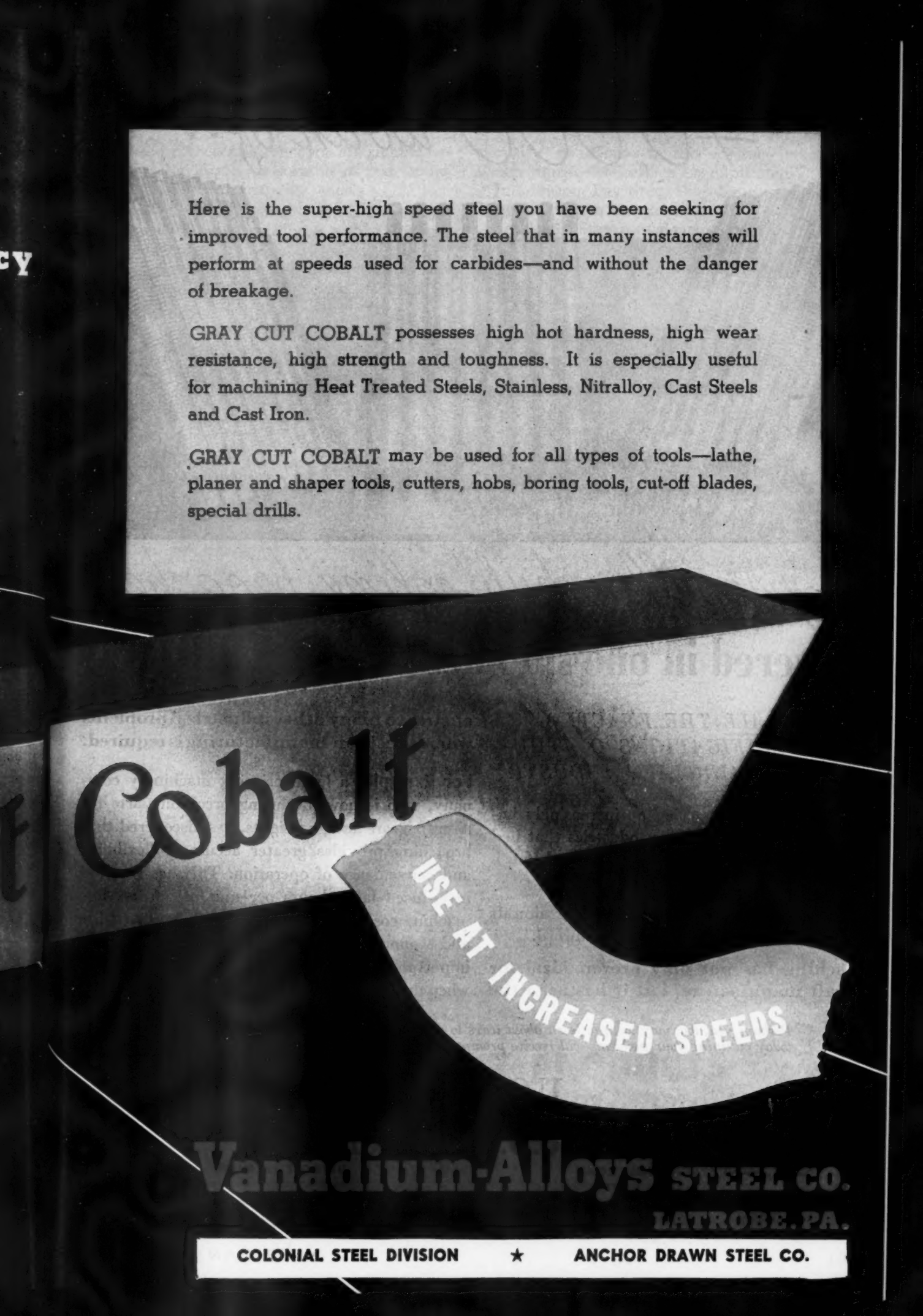
Projecting GREAT POSSIBILITIES

for Postwar Productive Efficiency

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Top Performance Consistently Duplicated

GRINDING WHEELS · HONING AND SUPERFINISHING STONES · PORTABLE SNAGGING WHEELS
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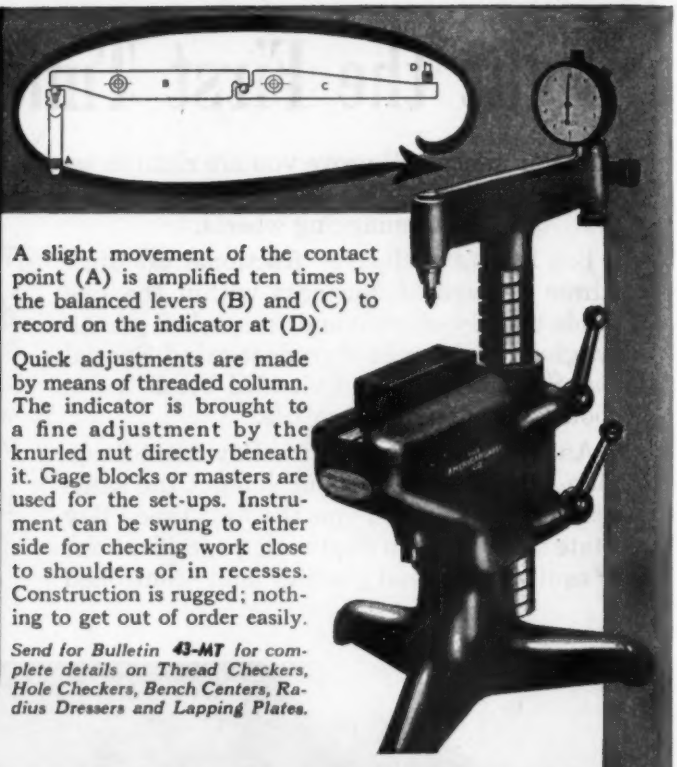

A slight movement of the contact point (A) is amplified ten times by the balanced levers (B) and (C) to record on the indicator at (D).

Quick adjustments are made by means of threaded column. The indicator is brought to a fine adjustment by the knurled nut directly beneath it. Gage blocks or masters are used for the set-ups. Instrument can be swung to either side for checking work close to shoulders or in recesses. Construction is rugged; nothing to get out of order easily.

Send for Bulletin **43-MT** *for complete details on Thread Checkers, Hole Checkers, Bench Centers, Radius Dressers and Lapping Plates.*

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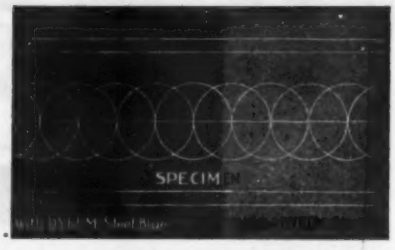

simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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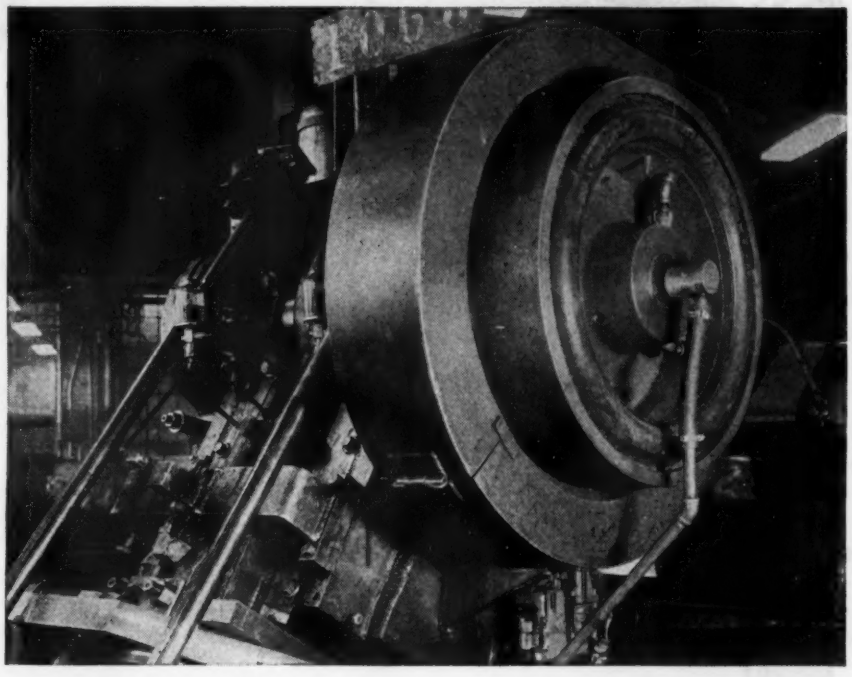
The performance and economy of the Fawick Airflex Clutch for all types of heavy machinery drives has been thoroughly demonstrated in hundreds of applications.

There is complete freedom from the usual troubles of conventional clutches, with less idle time, fewer repair and maintenance cost items.



The FAWICK Airflex Clutch

...saves TIME, space, maintenance and repairs. It has no arms, toggles or springs—needs no lubrication or adjustments—controls power and torque by air—absorbs shocks and vibration.

Proved by the Navy under battle conditions and on heavy-duty drives throughout industry.

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ECONOMY GRINDING LUBRICANT E-1, the original paste form grinding compound has been preferred for fast grinding, accurate form and finest finish since the beginning of wet grinding.

Our technical representative will be glad to recommend the correct lubricant for your grinding job. Catalog—1945-G-18, containing a wealth of grinding information, is yours for the asking.

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The Pioneer

Almond Three-Jaw Drill Chucks were Pioneers in their field—the first to be placed on the market. They have formed a necessary part in the logical procedure of machine developments over the past seventy and more years.

Almond Drill Chucks are made in types and sizes *to fit all machine tools and portable drills.*

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The Original Manufacturers of Drill Chucks

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Tubular welded frames with forged ends insure a maximum of accuracy with a minimum of weight.

There are a variety of types available with either micrometer heads or dial indicators to cover a range of capacities from 0 to 168 in. . . . *Write for Bulletin 200* or outline your gaging problems.

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Desmond Cutter

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We manufacture a complete line of Dressers and Cutters. Write for copy of catalog "A".

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ARMY (E) NAVY

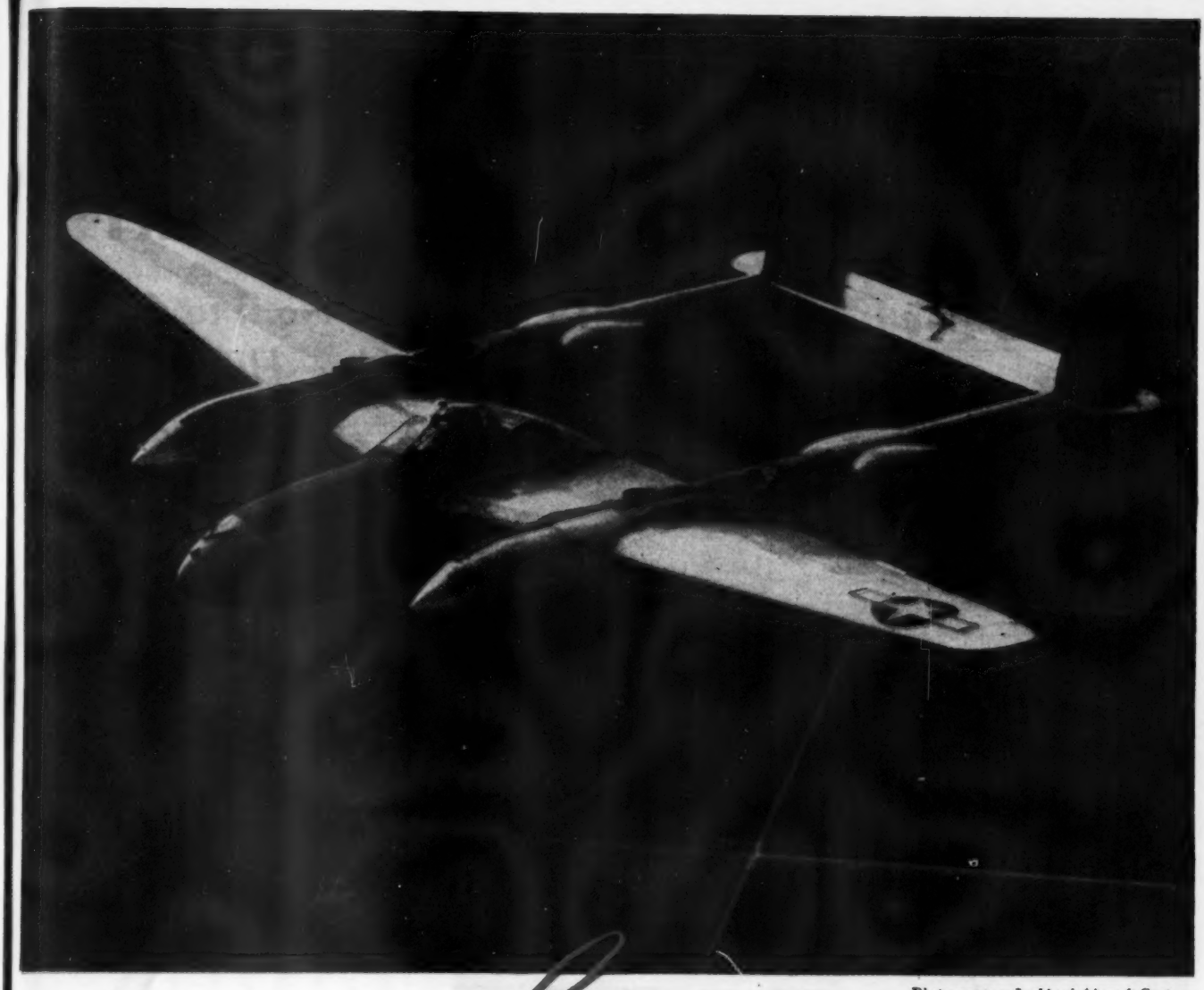

Photo courtesy Lockheed Aircraft Corp.

STROKE OF *Lightning* IN THE SKY

...RIDING ON LUNGS OF SPECIAL ALLOY STEEL

FOR the superior high-altitude performance of the Lightning and other first-line American warplanes, give primary credit to their engine "lungs" —the GE Turbo-Supercharger—a milestone in research and design, and a triumph in metallurgy and production.

Allegheny Ludlum collaborated on turbo-supercharger research for years before the war. Our chief contribution was the development of a commercial technique to centrifugally cast the supercharger diaphragm—an intricate shape which was formerly laboriously fabricated by welding. This casting, made of a highly complex alloy steel which maintains its strength at red-hot temperatures, was much stronger, more durable and more efficient than the fabricated article. And, even more important, the way had been opened for quantity production.

Already, in gas turbine work and other directions, these developments are bearing additional fruit. Just remember that the function of Allegheny Metal and our other special steels is either to do the thing that once seemed impossible, or to do better what is already being done. Let us help you apply these materials to *your* needs for improved service in the face of heat, wear or corrosion.

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Brackenridge, Pennsylvania

ALLEGHENY METAL
The Time-Tested Stainless Steel

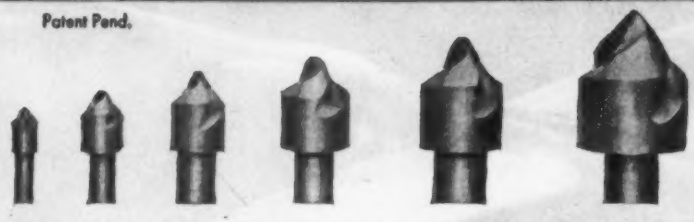
W&D 9494-D

ALSO HANDLED AND STOCKED BY ALL JOSEPH T. RYERSON & SON, INC. WAREHOUSES

Announcing an addition to the GROBET "Complete Line"

Grobet
TWIN FLUTED COUNTERSINKS

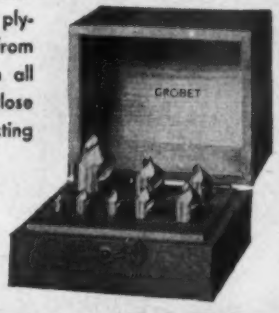
Patent Pend.



Twin-fluted for precision work. They give a very smooth micro-inch finish, but are readily adaptable for coarser work. They are fast cutting. Recommended for countersinking, in aluminum, magnesium, steel, plastics, plywood, etc. Perfect chamfer is guaranteed, free from ridges or chatter-marks—accurately uniform in all cases. Made of high speed steel, ground for close tolerances after hardening, and fulfill the exacting Grobet standards of accuracy.

GROBET TWIN FLUTED COUNTERSINKS are obtainable in given sizes or offered in a strong box of polished wood containing eight countersinks to the set (two in duplicate sizes).

At present, made in 6 sizes from ¼ to 1"; in 41, 45 and 30 degree angle c/-l.



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IMPORTERS OF GROBET SWISS FILES — MFRS. OF GROBET ROTARY FILES

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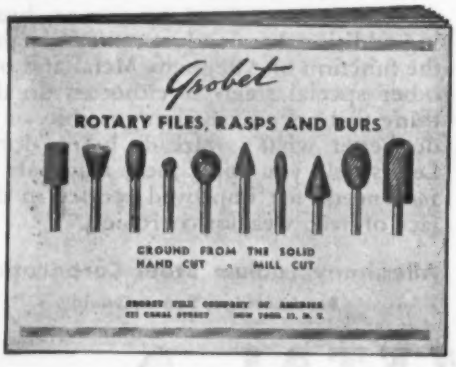
Send for NEW "Catalog DR"



• *Now off the press*—the most complete of its kind, illustrating the full line of GROBET ROTARY FILES, CUTTERS, DIE-SINKER'S BURS, etc., in size, shape and coarseness of cut for every industrial purpose.

(Please make your request for "Catalog DR" on your firm letterhead)

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421 CANAL ST. • NEW YORK 13, N. Y.

IMMEDIATE DELIVERY

No. 1 to 60
New High Speed
Long Length

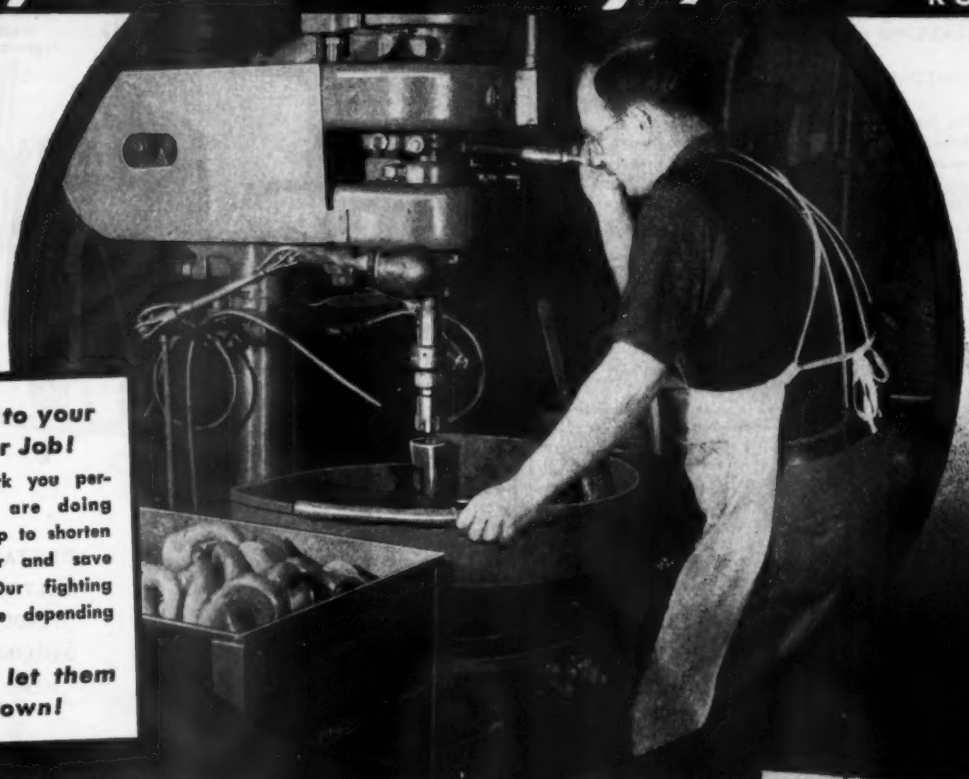
DRILLS

No. by Gage	*Length*	*Our Price Net Each*
1 to 10	6¼	$ .75
11 to 20	5¾	.75
21 to 30	5⅜	.75
31 to 40	5¼	.75
41 to 50	4½	.75
51 to 60	4¼	.75

If you buy 60 drills or more — 20% discount

VICTOR
MACHINERY EXCHANGE
INC.
251 CENTER STREET
NEW YORK N. Y.

"Taps that Fill the Gaps" ...AND KEEP PRODUCTION ROLLING!



Size of Thread being tapped, 1-31/32" — 16 NS; length of Thread, 1¼". Number of pieces per hour off drill press — 40. Number of pieces per hour in hand operation for hand sizing—20. Photographs permitted by courtesy of Miller Mfg. Co., Detroit.

Stick to your War Job!

The work you personally are doing may help to shorten the War and save lives. Our fighting men are depending on you.

Don't let them down!

MURCHEY

SOLID ADJUSTABLE TAPS

TYPE "E" FOUR CHASERS • TYPE "R" SIX CHASERS

Sometimes a machine does not permit the use of a collapsible tap. Sometimes space is too limited. Sometimes sizing operations are required. When such circumstances arise, MURCHEY SOLID ADJUSTABLE TAPS solve the problem. Although not equipped with collapsing devices, they nevertheless have all the other advantages of a collapsible tap. They fill the gap between collapsible and solid taps. *Being adjustable,* correct decimal size is always maintained. Inserted chasers are readily removed for resharpening. Once you purchase the tap body, you can obtain a wide variety of thread sizes merely by purchasing other chasers. The chasers, which are less expensive than solid taps, may be replaced when necessary. Write for complete descriptive literature.

MURCHEY MACHINE & TOOL CO.

Detroit 26, Michigan

Murchey manufactures all types of Collapsible Taps, Self Opening Die Heads, Thread Milling Machines and Shell Tapping Machines. Write for catalogs. Address Dept. A.

MURCHEY

WHEN COLLET WORK IS INDICATED - SPECIFY

Precision Collets

For 10" ATLAS & LOGAN, SOUTH BEND, SHELDON, CRAFTSMAN, POWR-KRAFT, CLAUSING and other important lathes.

IMMEDIATE DELIVERY FROM STOCK

The Precision name on a collet is your unconditional guarantee of accuracy in machining, hardening and grinding. Make sure then to specify Precision when ordering from your dealer. Literature on request.

- MODEL 3AT. For 10" Atlas, Logan, 12" Craftsman, No. 700 Powr-Kraft.
- MODEL 3C: For 8" & 9" South Bend, Clausing, Hardinge No. 3, 10" LeBlond, etc.
- MODEL 1A: For 8" & 9" South Bend.
- MODEL 5C: For 9", 10", 16", 18" South Bend, 1" capacity Sheldon, Schauer, Sebastian, etc.
- MODEL 4C: For 14½" South Bend, ¾" capacity Sheldon, Hardinge No. 4, Elgin, etc.
- MODEL 480: For Logan Screw Machine, Turret Lathe and attachments; Warner & Swasey No. 1, etc.
- BREN Collet: For Handwheel & Lever-Type Speedichuk.

KLUTCH - KOLLET (Step Chuck) for checking work to 2¾" diameter with collet accuracy. Head unhardened for easy boring. Fits 3AT, 3C, 1A adapters only. List unbored $7.50 each.

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ERRINGTON MECHANICAL LABORATORY

STAPLETON, STATEN ISLAND 4, N. Y.

MULTIPLE HEADS

Super-Sensitive Fixed Center Multiple Drilling Heads

Fixed-Center Auto-Reverse Multiple Topping Heads

All Parts Fully Enclosed to Insure Pressure Lubrication and Rigid Support of Adjustable Spindles

ADJUSTABLE MULTIPLE SPINDLE DRILLING HEAD

Whether for war or peacetime production, the quality of your product is dependent upon the use of reliable controls. MASTER GAUGES are recognized by the leaders in the industrial field as being instruments of exceptional durability and precision.

Thread Plugs	Snap	Thread Concentricity
Thread Rings	Flush Pin	
Plain Plugs	Profile	Jigs, Dies and Fixtures
Plain Rings	Build-up	

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Phone: University 3-7676

INSPECTORS STAMPS

for Steel Stamping or Acid Etching

Matthews code symbol stamps are used in every phase of industry for inspection, coding or other confidential marking of products. Their uses are unlimited . . . stamps are supplied in stock or special designs to suit your need.

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Inspectors' stamps are supplied in Matthews "Safe-Hed" steel stamps, or "S-22" synthetic stamps for acid etching. Complete data given upon request. Write today for Bulletin A-1 on Steel Stamps and Bulletin S on "S-22" stamps.

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IT'S SO

Simple

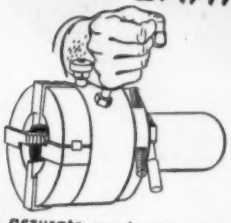
TO CUT

GOOD THREADS

with a

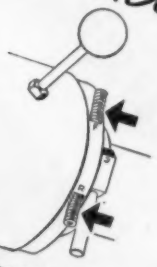
GEOMETRIC DIE HEAD

1. *Simple* TO OPERATE



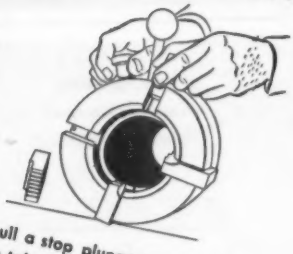
For fast, accurate production of external screw threads, the Geometric Die Head has proved to be one of the simplest tools — so simple that even a novice can operate it. Positive camming arrangement releases chasers automatically so die head can be withdrawn from work without reversing.

2. *Simple* TO ADJUST



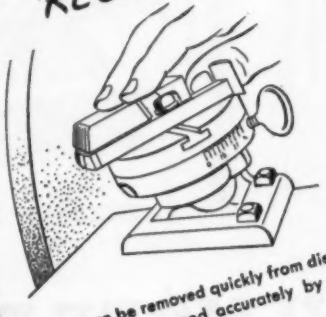
A quick and positive adjustment of the chasers to the required decimal size may be made by means of two opposed adjusting screws.

3. *Simple* TO CHANGE CHASERS



Just pull a stop plunger and the chasers can can be taken out in an instant and re-placed. Spring tension keeps chasers from falling out by themselves.

4. *Simple* TO RE-SHARPEN



Chasers can be removed quickly from die head and can be sharpened accurately by means of a simple grinding fixture

Write for Catalog

THE GEOMETRIC TOOL COMPANY

New Haven 15, Connecticut

A DIVISION OF THE GREENFIELD TAP and DIE CORPORATION

CARD TAPS

ARE YOU INTERESTED IN BETTER TAPPING?

If better production tapping is your objective, it will be to your advantage to come to Card. We can help you because we sell better tapping performance.

The high quality of work done—the quantity produced—the economy of using Card Taps—will be apparent on any tapping job. Just put Card Taps to work and let them prove their superiority.

A regular catalog tap in most cases will meet your needs without using special taps. You'll find your requirements covered in the Card Catalog No. 34. Write for a copy.

Card taps are sold by leading dealers everywhere

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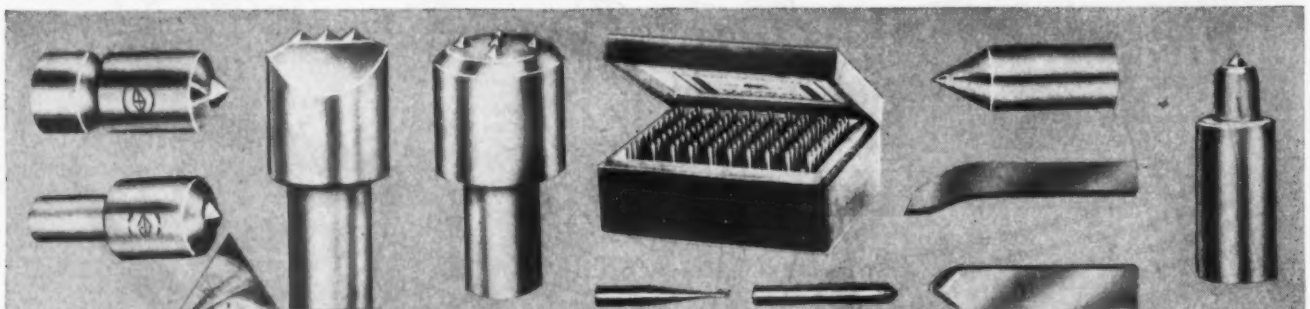
Mansfield, Mass., U. S. A.
DIVISION OF UNION TWIST DRILL CO.

STORES: New York: 61 Reade St., Chicago: 11 South Clinton St. Detroit: 5527 Woodward Ave., Seattle: 568 First Avenue, South Los Angeles: 168 South Central Avenue San Francisco: 121 Second St.



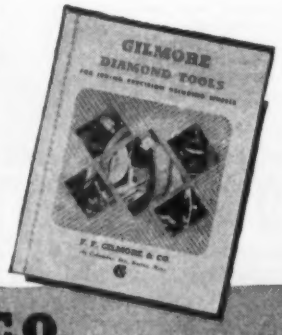
GILMORE DIAMOND TOOLS

are available for every wheel truing need

As specialists in the cutting of diamonds and in the design and manufacture of diamond tools, Gilmore is prepared to meet the most exacting demands of the metal working industry. Our service includes diamond cutting to your specifications, furnishing octahedrons, natural elongated diamonds and resetting by experts.

The Gilmore Diamond Tool line includes Hand and Machine Wheel Truing Diamond Tools, Multiple Diamond Wheel Dressers, Needle Point Diamond Tools for use on wheels for grinding taps, thread gages, etc., and Diamond Tools for truing specially formed grinding wheels.

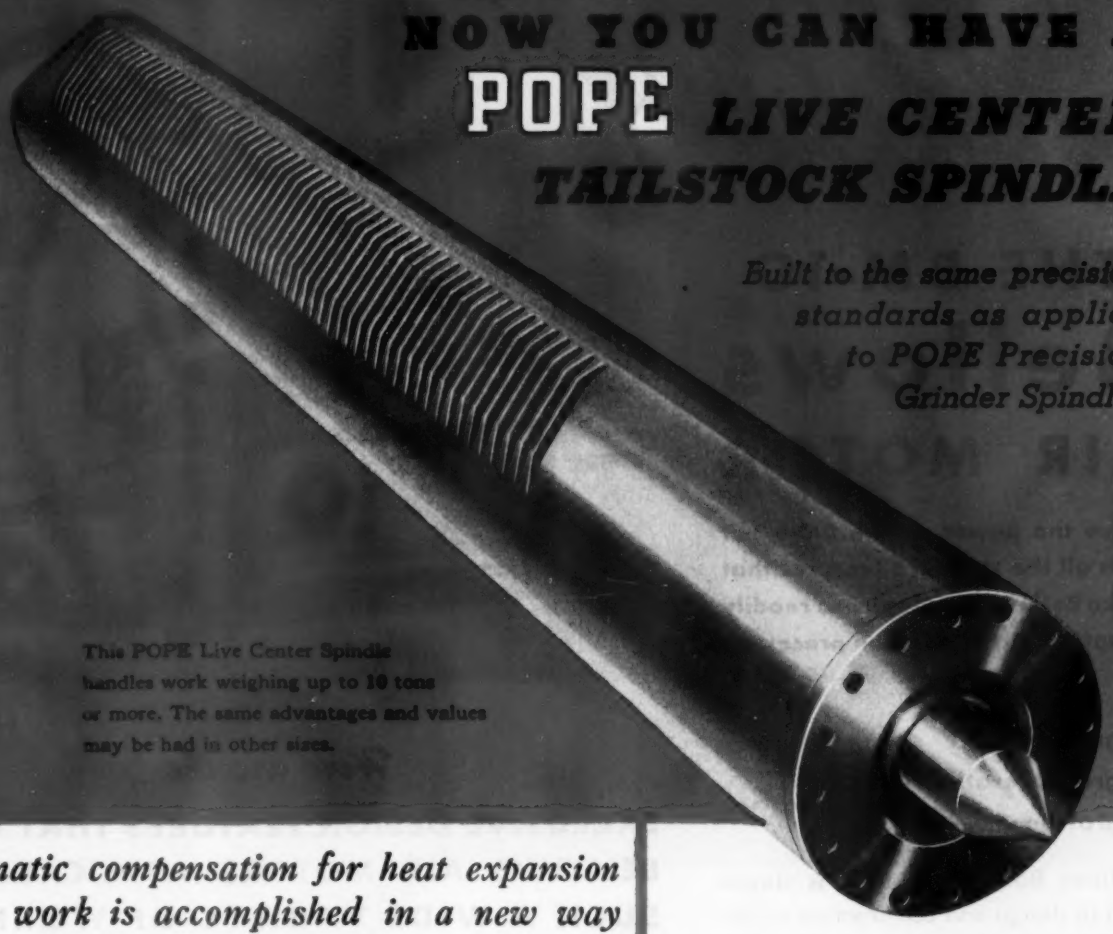
Write for illustrated literature giving full information on the Gilmore line and service.



F. F. GILMORE & CO.
285 COLUMBUS AVE. BOSTON, MASS.

NOW YOU CAN HAVE A POPE *LIVE CENTER TAILSTOCK SPINDLE*

Built to the same precision standards as applied to POPE Precision Grinder Spindles



This POPE Live Center Spindle handles work weighing up to 10 tons or more. The same advantages and values may be had in other sizes.

Automatic compensation for heat expansion of the work is accomplished in a new way

Expansion of the work from heat generated by the cutting tool often puts destructive loads on live center bearings unless provision is made to take care of these loads.

Without such provision the workman must loosen the center by hand to release the excess end pressure as best he can. Loosened too much the work may be spoiled; too little and the bearings may be spoiled.

The problem has been to provide compensation for this expansion without allowing any yielding of the center from its true axial position under load.

In the POPE Precision Compensating Live Center Spindle this problem has been solved. The operator has only to set up the work, adjust the center in his accustomed manner and *then forget all about center troubles.*

Ask us to tell you more about this new POPE Live Center Tailstock Spindle as it applies to *your* lathes.

No. 23

HOW IT WORKS

In the POPE Compensating Live Center Tailstock Spindle the shaft is mounted on oversize precision anti-friction bearings having abundant capacity to carry all radial loads involved.

The end thrust is taken on a separate set of preloaded thrust bearings of ample capacity yieldingly mounted in a manner to allow for work expansion without building up excessive pressure on the bearings.

The axial movement necessary to provide this compensation is accomplished without allowing any deviation from the accurate centering support provided by the radially preloaded SKF double row roller bearings. POPE Sealed Lubrication is employed throughout.

REG. U. S. PAT. OFF.

POPE MACHINERY CORPORATION

ESTABLISHED 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS

BUILDERS OF PRECISION SPINDLES

and Now!

THE BM-10 Bellows AIR MOTOR

Twice the power of the BM-5 but with all the standard features that make Bellows Air Motors so readily adaptable to production processes.

- **Integral Valve**
- **Integral Operating Controls**
- **Integral Speed Controls**

The Bellows BM-10 Air Motor is almost identical in design and construction to the Bellows BM-5 double-acting Air Motor but develops slightly more than twice the power on a given air line pressure. The new BM-10 Air Motor extends the Bellows principle of *Controlled Air Power* pulling, pushing or lifting to heavy duty operations.

Engineering Data
YOU'LL WANT TO KNOW

POWER THRUST: Approximately 10 times Operating Air Line Pressure

LENGTH OVERALL: Stroke plus 7½"

STANDARD STROKES: 1½", 3", 6", 9", 12", 15", 18"

SPECIAL STROKES: ½" to 48"

HEIGHT: 5 13/32" including foot mounts

WIDTH: 4¾"

MOUNTS: Angle mounts for bottom, side or top mounting furnished as standard equipment. Pivot or Trunnion Mounting also available.

Here are the
EXCLUSIVE DESIGN FEATURES THAT MAKE BELLOWS AIR MOTORS APPLICABLE TO SUCH A WIDE VARIETY OF WORK.

1. An air valve that is an integral part of the air motor unit.
2. A valve operating lever adjustable "to any angle in any plane" making possible ready synchronization of the air motor with any reciprocal moving machine part.
3. Integral throttle valves which provide precise and unlimited speed control of piston rod advance and retraction, independently.
4. A valve position which can be changed to permit either the piston rod extended or the piston rod retracted when the valve operating lever is in "released" position.

Would you like to know how other plants are using Bellows Controlled Air Power Devices for Faster, Safer, Better Production? Write today for a copy of the big, new, free Photo Facts File—full 8" x 10" illustrations of production ideas you, too, can use.

The Bellows Co.
ESTABLISHED 1911
AKRON 10, OHIO

Design for deisel power control by PARKER

The "nervous" system and the circulation system of a Diesel power plant depend on tubing, with suitable fittings and valves.

Without the tubing installation, the engine can't run. And that's true of many other important kinds of machines.

Designing and building tubing installations, and making their valves and fittings, has been a Parker job for more than twenty years. We call it Fluid Power Engineering.

Parker is ready to supply you with hundreds of types of valves and fittings--all precision-built to precise specifications. Or with completely fabricated tubing jobs, ready to install.

And our Fluid Power Engineers are ready to work with you on plans and designs, with plenty of knowledge and broad experience to draw from.

Parker-Engineered tubing systems provide you with streamlined flow, to conserve power and lessen pressure drop —with compactness and neatness—with ease of access for service and maintenance—and with complete protection against leakage, even under conditions of high pressure, vibration and abuse.

This complete service, or any part of it, is yours to command, for improving present products or in planning for the future.

For more information, or for the service of a Parker Fluid Power Engineer, write to The Parker Appliance Co., 17325 Euclid Ave., Cleveland 12, O.

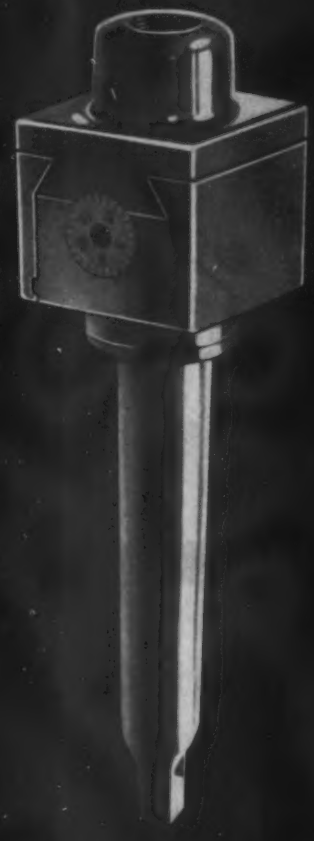
PARKER

APPLIANCE COMPANY

FLUID POWER ENGINEERING

ACCURACY

...a Degree of QUALITY



CRITERION *Boring* HEADS

Since, in this case, accuracy is a degree of quality Criterion Boring Heads rate very high. Especially noted for their accuracy, they also offer other superiorities. Lead Screw ground from solid AFTER hardening. Large offset adjustment. Interchangeable shanks. Sold everywhere. Ask your dealer. Request free literature.

CRITERION
MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

LESS *Guesswork* MORE *Accuracy*

with
KESTER Solder FLUX

• Kester eliminates guesswork, for whatever the solder job. For delicate dip-soldered electrical connections, sweating operations, or various types of seams, Kester has the right flux to make it permanent. Tight solder-bonds with Kester fluxes resist shock, vibration, bending, contraction, and expansion *without failure!*

• Kester fluxes help to make the service of your product trouble-free, because Kester's 46 years of practical experience and laboratory research make it possible for you to have the *best* flux for whatever metal you're using... the correct flux to protect your product.

• Consult Kester engineers; they'll gladly recommend the right flux for your operation. A letter today will bring their practical, experienced help—at no obligation.

★ BUY WAR BONDS ★

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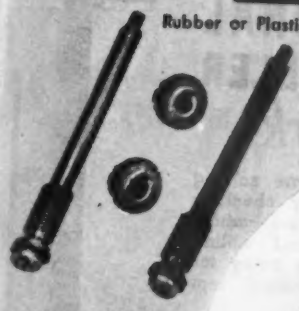
KESTER
Solder Fluxes
STANDARD FOR INDUSTRY

Rubber or Plastic Extrusion Screw.

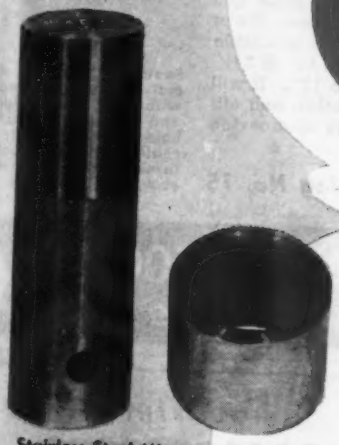


High Pressure Valve Seats

COLMONOY NO. 4
Nickel base hard-facing alloy. Rockwell C hardness, 35 to 40. Specific gravity, 6.91. Melting point, 2025°F. Approximate composition %, Ni. 75-85. Cr. 8-14. B. 1-2. Balance Fe. Si. C. 7 max.

COLMONOY No. 4

RESISTS WEAR
RESISTS CORROSION
IS MACHINABLE



Stainless Steel Mixer Shaft and Bushing

COLMONOY No. 4 is a versatile, all-around hard-facing nickel base alloy that has a wide field of application. It is ideal for the thousands of uses that require excellent resistance to wear and corrosion plus good machinability. Colmonoy No. 4 has these properties—good resistance to wear and galling, and very high corrosion resistance. It can be machined readily with carbide tools. It can be cast.

This hard-facing alloy is available in cast welding rod form for oxy-acetylene application, as well as in special cast forms. It is but one of many grades of Colmonoy hard-facing alloys ranging in hardness from 15 to 68 Rockwell C. All grades are fully described in our general catalog.

Door Panel Draw Ring

Send for CATALOG
Covers complete line of standard Colmonoy hard-facing alloys, special alloys and engineering service.

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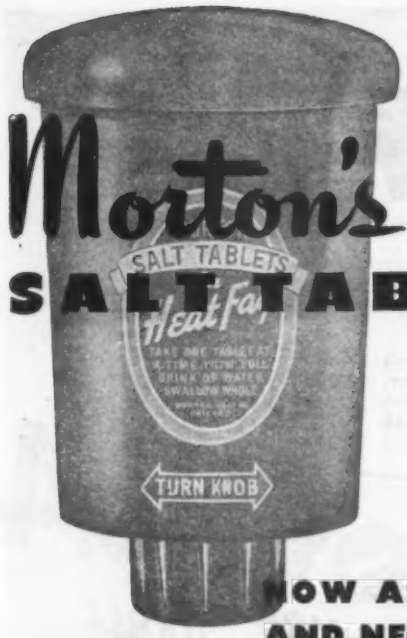
DETROIT, NEW YORK CITY, BUFFALO, CHICAGO, TULSA, LOS ANGELES, SAN FRANCISCO AND IN CANADA

WALL-COLMONOY CORP.

720 Fisher Bldg., Detroit 2, Michigan

Morton's SALT TABLETS



NOW AS FAMILIAR AND NECESSARY AS THE LUNCH PAIL . . .

It's the exceptional industrial plant that fails to provide salt tablets for its employees. Only a few years ago it was otherwise. Salt Tablets have become an industrial "must" for men who work — and sweat.

Sweat robs the body of vital salt. This throws the body fluids out of balance. The result is Heat-Fag, inalertness, accidents, heat prostrations. The preventive is salt and water—water to restore the moisture lost in sweat, salt to restore the saline balance. Water alone won't do it. Both are needed.

The easy, simple, sanitary way to provide salt to workers who sweat is Morton's Salt Tablets available at every drinking fountain. The cost is less than a cent a man per week.

In salt tablets, as with other grades and types of salt, Morton is the recognized leader. Order Morton's Salt Tablets and Dispensers from your distributor or directly from this advertisement. Write for free folder. Morton Salt Company, 310 S. Michigan Ave., Chicago 4.

MORTON'S DISPENSERS

They deliver salt tablets, one at a time, quickly, cleanly — no waste. Sanitary, easily filled, durable.

800 Tablet size, $3.25

MORTON'S SALT TABLETS

Morton's Salt Tablets are available either plain or with dextrose.

Case of 9,000, 10-grain salt tablets - $2.60

Salt Dextrose Tablets, case of 9,000 - - $3.15

MORTON'S SALT TABLETS

Investigate

THE POSSIBILITIES OF THE NATIONAL KEYSEATING MILLER *on Your Work*

• Shops all over the country are solving difficult keyseating problems by chucking this attachment on their drill presses, radials and horizontal boring mills—and milling keyseats in pieces too large or bulky for convenient handling on keyseating machines.

The "National" goes through the hole once and mills keyseats with parallel sides and parallel with the axis of the bore. It's a big time and money saver and is available in standard stock diameters from ½" to 3½" for cutting lengths from 1⅞" to 12". It will keyseat in blind holes, taper holes, and offset holes. We also manufacture oil-grooving millers.

Several widths of cutters can be used with each size miller and many different hole diameters keyseated with one tool through the use of eccentric bushings.

WRITE today for Catalog No. 15

NATIONAL MACHINE TOOL CO.
CINCINNATI, OHIO

HOLMAN *BETTER, FASTER HOLE FINISHING*

HELICAL TAPER PIN REAMERS

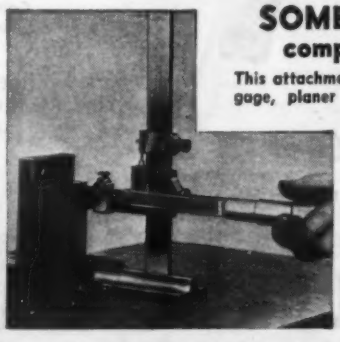
Scientifically made of selected steel under modern processes. Long lived, economical, accurate. Details on request.

HOLMAN REAMER CO.
MANCHESTER, CONN.

LUERS Patented Cutting Off Tool Holders
Patented Cutting Off Blades

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

Manufactured By
J. Milton Luers — 12 Pine St. — Mt. Clemens, Mich.
Produced under License Issued by John Milton Luers Patents Inc.



SOMERSET LAYOUT
complete set $16.00

This attachment quickly converts your height gage, planer gage or gage blocks into a tool that can be compared to a jig borer. With it you can layout work easily and accurately. Designed to mark off vertical distance from a plane surface and by the use of the inserted center punch holder, the locating of holes for jigs, fixtures and dies can be accurately obtained. Write for complete details.

SOMERSET TOOL COMPANY
232 Virginia Street — Hillside, New Jersey

WALDES

TRUARC

RETAINING RING

U. S. PATENT RE. 19,369

● Waldes Truarc expands or contracts without distortion and without permanent set, fitting tight all around the groove. It offers important advantages over shoulders, nuts, collars, etc., for all thrust-load fixings in shaft and housing applications. It saves space, weight, assembly time and machining costs.

● Waldes Truarc presents a significant advance in retaining rings, well worth your thorough investigation. We will gladly furnish samples and full data for tests, upon request.

● Internal type National Aircraft Standard 50.
External type National Aircraft Standard 51.

WALDES KOH-I-NOOR, INC. Long Island City 1, N. Y.

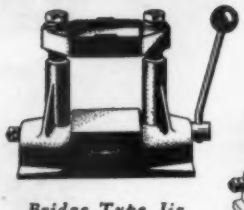
Canadian Representatives: Pronco Progress & Engineering Corp., Ltd., 72-74 Stafford St., Toronto

The New Woodworth "Cone-Lok" Jigs

WOODWORTH "CONE-LOK" Jigs utilize the great breaking power of perfectly mated male and female cones. This principle assures maximum locking effect in either direction. WOODWORTH "CONE-LOK" Jigs are rugged, have few moving parts, are more adaptable, have sealed-in lubrication, built-in safety and the mechanism is protected from chips.

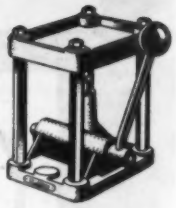
Catalogue No. 45-J describing the sensational "Cone-Lok" principle is now available. *Write for your copy.*

ACCURACY YOU W CAN TRUST



Bridge Type Jig for heavy duty.

All Purpose Jig for general machine shop work.



"Up-Clamp" Type Jig for close tolerance work.

The Jack-Lok, a special fixture clamp using the "Cone-Lok" principle for use in special fixture designs is available.

WOODWORTH

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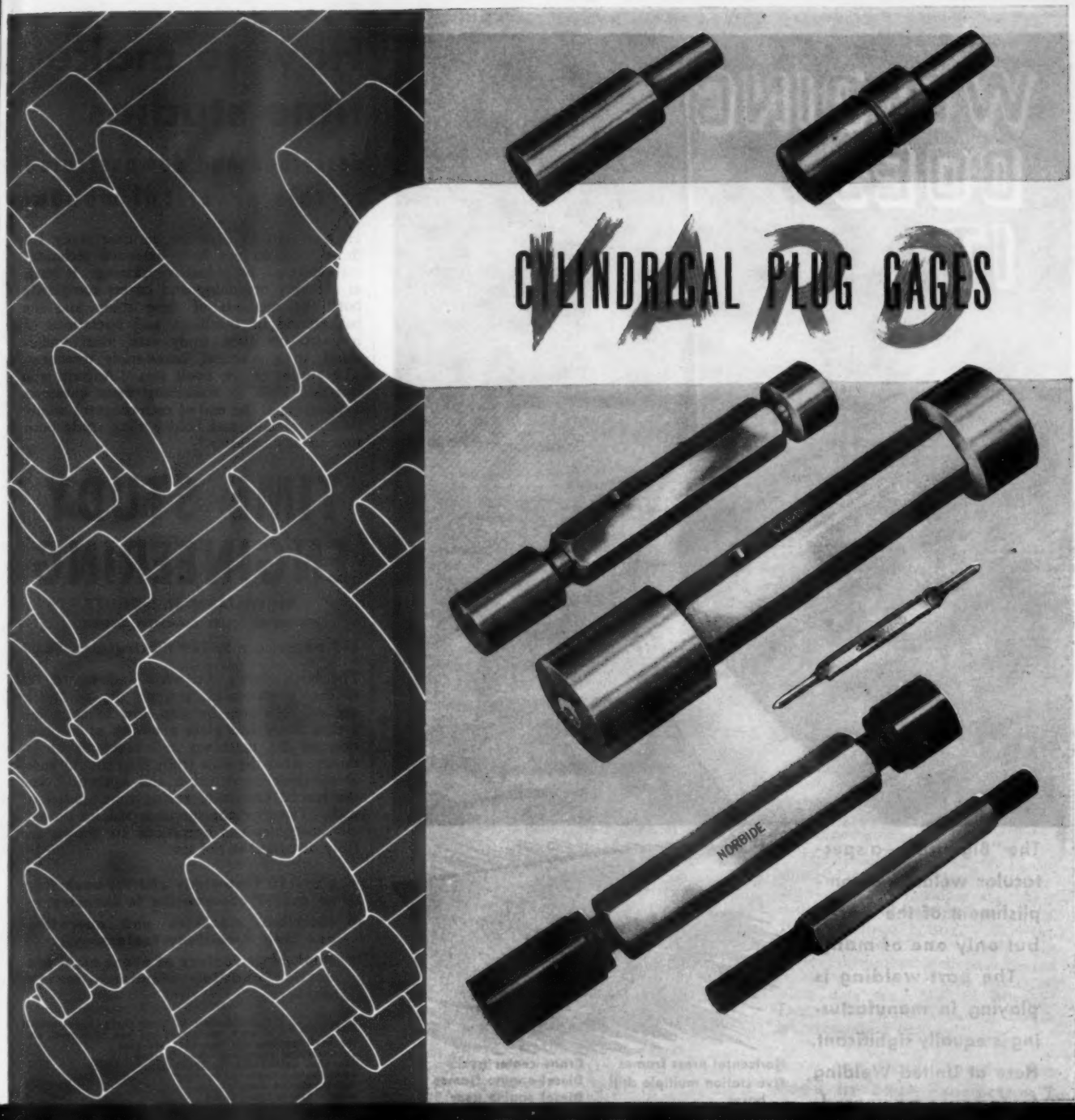
PRECISION GAGES • PRECISION MACHINED PARTS • PRECISION TOOLS



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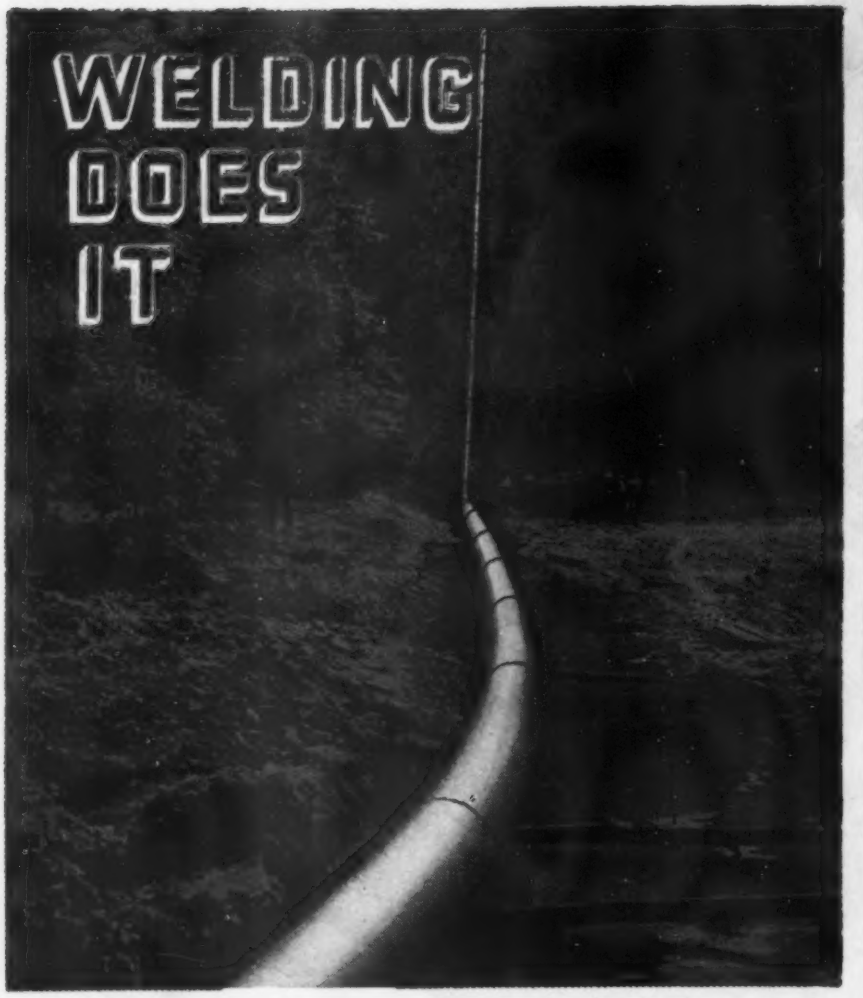

The "Big Inch"—a spectacular welding accomplishment of the war—but only one of many.

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MIDDLETOWN, OHIO

WELDING FABRICATORS OF MODERN DESIGNS

How to make time studies

described and demonstrated in this practical manual

Here at last is a course in time study for those who do not have extended technical, mathematical, or industrial training. It starts at the very beginning and covers completely both the methods of time study and the background of machines and operations of industry the time study man must understand, in a practical, home-study treatment. The author of the book says, "Anyone who can rate 90% in answering these questions (appearing at the end of each chapter) would be able to take and hold a time study position in any industry."

TIME STUDY ENGINEERING

By WILLIAM H. SCHUTT
William H. Schutt Associates, Detroit

130 pages, 6 x 9, 124 illustrations, $5.00

The book shows the whys and wherefores of time study work, reviews the arithmetic needed, tells step by step how to carry out a time study and gives a wealth of information on the machines and processes of industry, what the time study man should know about their construction and operation, and the special factors of taking time studies on each. Twenty-eight specimen studies on specific machines and operations are shown and fully discussed in the text.

- **gives 26 time-study charts; each from an actual observation in industry.**
- **describes machines and operations and their time-study factors.**
- **emphasizes factors of economical production and fair standards for the worker.**

Covers: Fundamentals of time study, requirements of work, equipment and how it is used, etc.; the basic motions and how they are used in analyzing operations; how to read the stop watch; how to study an operation and record the figures; how to rate the operator's efficiency; how to figure group bonus and standard hours; how to make process or flow charts, etc.

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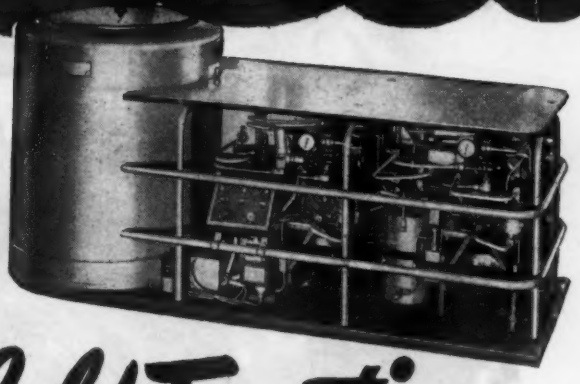
HERE'S WHY SO MANY INDUSTRIAL MANUFACTURERS ARE USING COLD TREATING IN THEIR PRODUCTION



RESULTS OF *Cold Treating* with Deepfreeze Industrial Chilling Machines . . .

HARDENING OF METALS . . .

Drill life increased from 48 to 256 holes per grind.

Milling cutter life increased 17 hours per grind.

Form tool life increased from 150 to 510 pieces per grind.

Production increased from 3,000 to over 30,000 shell cases per punch.

STABILIZATION OF METALS . . .

Dimensional growth completely eliminated in gauges and all component parts of machine spindles.

Aluminum forgings and castings stabilized against distortion after machining.

Aircraft parts stabilized to work freely in low temperatures.

SHRINKING OF METALS . . .

Production doubled in shrink-fit assembly of airplane landing struts.

Production increased 250% in the shrink-fit assembly of a bushing in Diesel pistons.

Manufacturer saves $3,675 per year shrinking steel valve inserts.

TESTING AND MISCELLANEOUS USES . . .

Aircraft instruments and parts pretested for substratosphere reaction save lives and time.

Cold treating economically removes pitch from optical lenses.

Deepfreeze machine used for storage of quenched aluminum parts until forming operations are performed.

Sub-zero temperatures are used for freezing rubber to permit easier machining.

Cold Treating

Improves Quality . . . Conserves Production Time . . . and Reduces Operating Costs . . .

COLD TREATING provides industry with a new production technique capable of effecting economies in a wide variety of operations. That's why it has found general acceptance by most of the country's leading manufacturers.

COLD TREATING is being used extensively by industrial organizations working with metals, to increase metal hardness and uniformity of structure—qualities that assure longer part life and better performance.

COLD TREATING is proving highly productive for shrink-fit assemblies by eliminating warping and scoring and saving time in such operations.

COLD TREATING is drastically reducing the time required to stabilize gauges, gauge blocks and other precision instruments. By following simple, standard procedures it is possible to completely stabilize various types of gauges in a few hours whereas formerly years were required.

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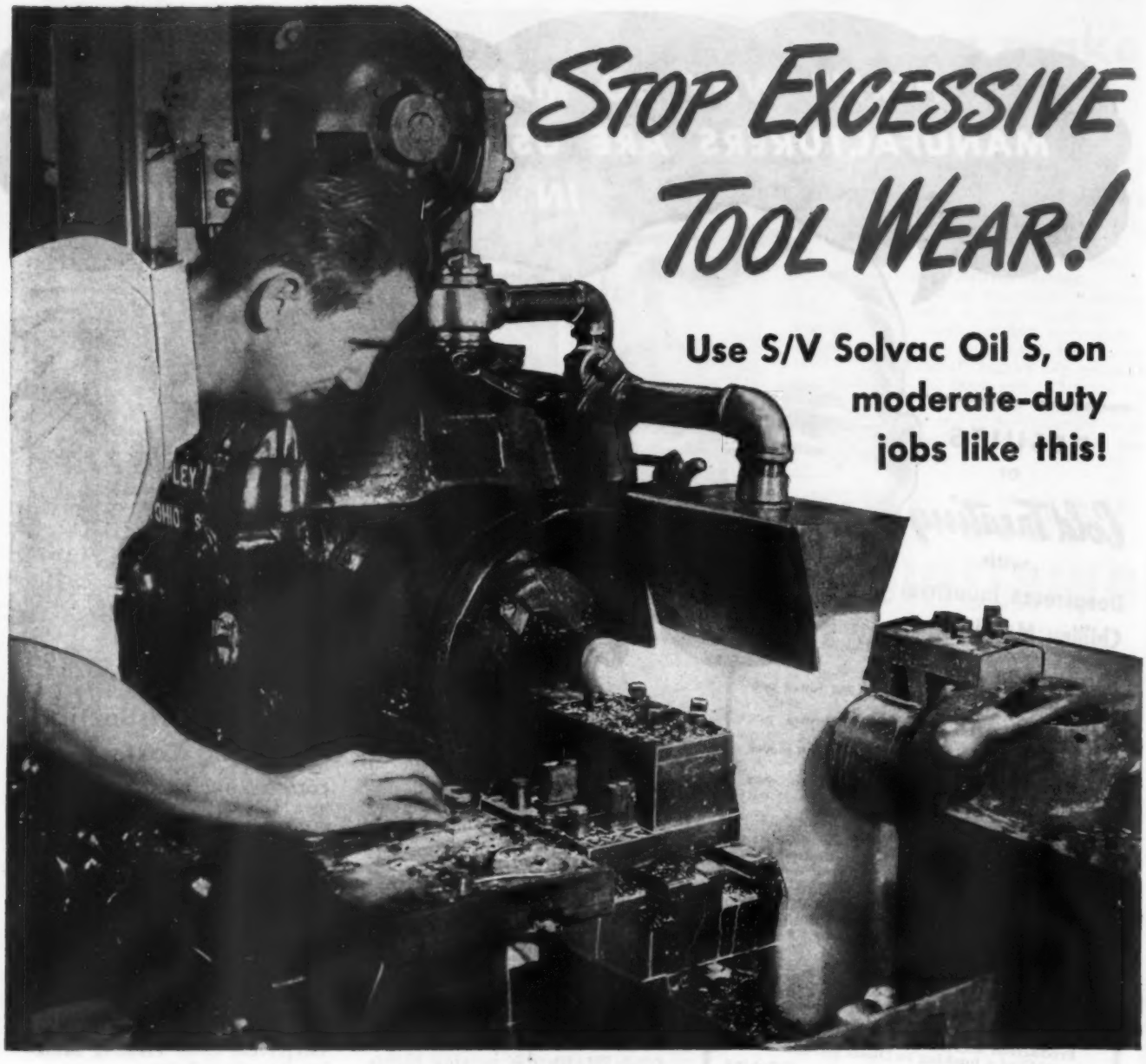
The Deepfreeze —120° F. Industrial Chilling Machine is designed to accommodate all of these industrial cold treating operations. Performance records furnish ample proof of the results obtained. A number of these are listed in the panel at the left. For complete data send for the 40-page Deepfreeze Cold Treating Booklet, described below.

How can Cold Treating be Used in Your Production?

There's a way to find out. Send us a number of the tools or parts you're using. Submit information on the material and the heat treatment to which they have been subjected. We'll cold treat them, report the treatment to you, and return them for service and performance tests.

FREE . . . HERE IS COMPLETE INFORMATION ON COLD TREATING . . .

A 40-page treatise that includes everything from the history of Cold Treating to tested procedures. If you are acquainted with the subject, it will bring you up-to-date. If you're unacquainted, it will furnish you with the information you need to adapt cold treating to your production. Write today for your copy of Bulletin No. I-4.



STOP EXCESSIVE TOOL WEAR!

Use S/V Solvac Oil S, on moderate-duty jobs like this!

FOR METAL-cutting operations, where cooling is essential, pressures are moderate and tool life is vitally important, you can depend on S/V Solvac Oil S.

Now setting high performance standards in many shops, this superior Socony-Vacuum soluble oil possesses both the extreme pressure properties and lubricity required to prevent excessive tool wear and frequent tool changes. Thus, it helps improve finish, reduce rejects and increase production.

Like other S/V Solvac Oils, covering all soluble oil needs, S/V Solvac Oil S gives you good rust prevention, non-gumming properties, exceptional emulsifying characteristics and stable emulsions.

See your Socony-Vacuum Representative for performance facts and expert assistance on applications to your operations.

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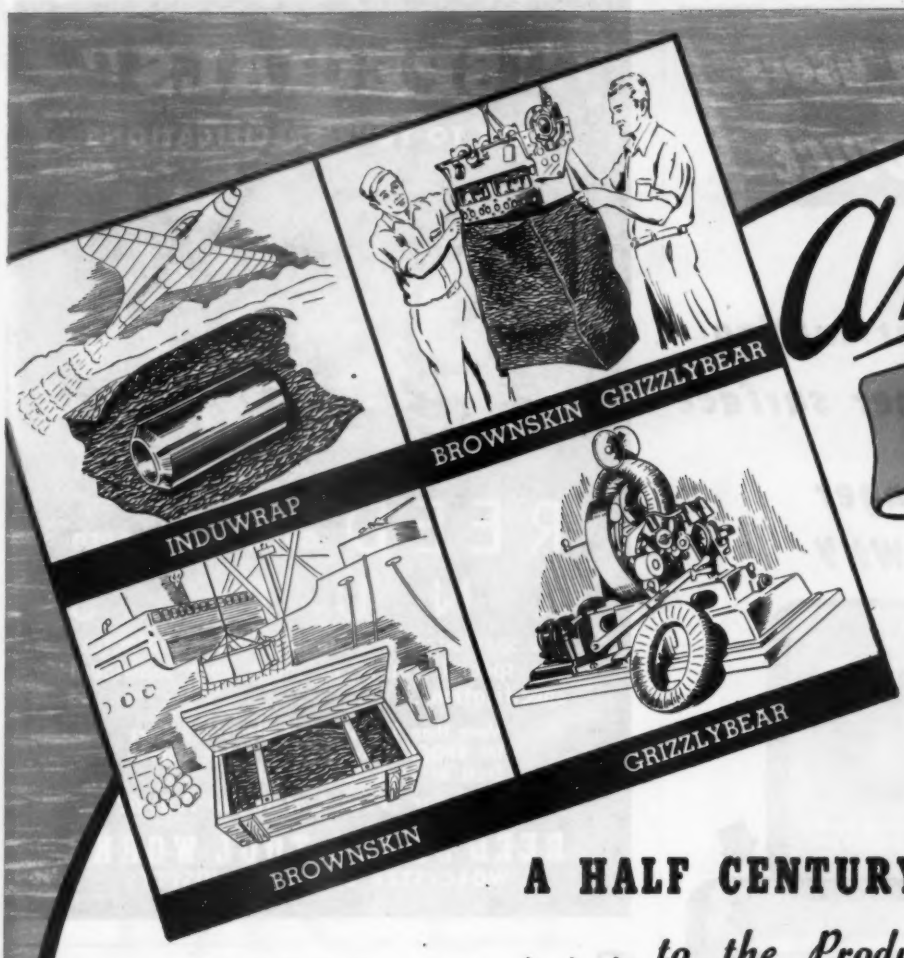

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Airplane engine and parts manufacturers were up against it for a grease-proof wrapper to prevent corrosion. Angier of Framingham produced it in INDUWRAP, which more than meets any specification ever drawn for a Grade A, Type I wrapper.

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Have you an essential problem in product protection? Put it up to Angier engineers.

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To: Hack saw users
A WORD OF ADVICE

Buy STAR Blades

FOR **faster cutting**

FOR **cleaner surface**

AND **they last longer**

HERE'S WHY

1. Keen, sharp teeth; hardened to cut fast and deep, wear longer.
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4. Large easy to read marking on all STAR blades make it easy to choose the correct type of blade for any job.

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Makers of hand and power hack saw blades, frames, metal cutting band saw blades and the Clemson D-17 lawn machine.

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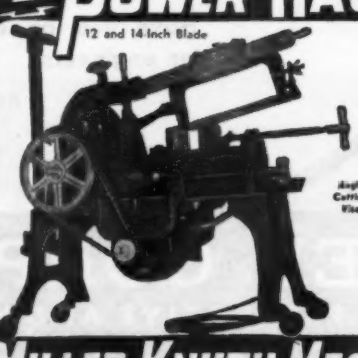

LOW PRICED

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Simple Cutting Wire

READY TO WORK

STURDY

ECONOMICAL

Write for Bulletin No. 100

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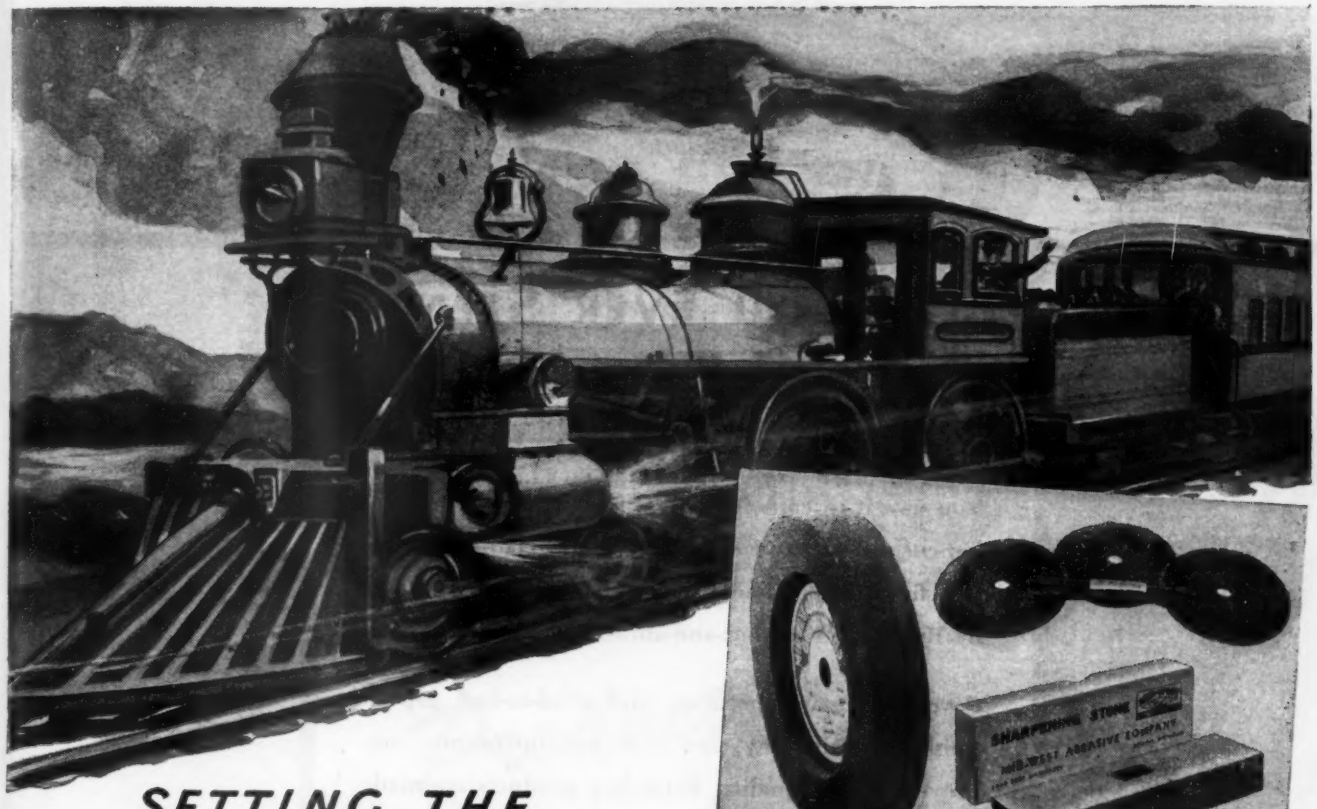

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Fifty years ago and more, the old wide-funnelled locomotive set the pace for any known means of transportation.

Today, the Mid-West Abrasive Company is a pace-setter for high-quality, dependable abrasive products, each engineered to perform a specific job with speed and perfection.

There are Mid-West items for every abrasive need —grinding wheels, sandpapers, honing stones, sharpening stones, wheel dressers or abrasive specialties.

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Please send complete data book on ☐ Grinding Wheels, ☐ Sandpapers, ☐ Superfinish Stones

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HAVE YOU EVER SEEN A Brightboy FINISHED PART?

You owe it to youself to see an example of fine, rubber-cushioned, precision-controlled Brightboy abrasive finishing—a smooth-surface revelation achieved by Brightboy's rubber-and-abrasive combination.

Covering, in one-operation, the grind-to-buff gap in finishing, Brightboy cuts time and operations; improves product quality. Brightboy products are made in three textures, for extensive work-adaptability on a wide variety of metals.

It will pay you to get Brightboy catalogs, prices and production data from your distributor. Brightboy field representatives are at your service to suggest production short cuts to better finishing.

Brightboy TUFF-TEX

Tougher texture, for finishing hard metals. The tougher binder accents the abrasive action, yet retains the soft rubber cushion, finishing and polishing in one operation.

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Smoother, finer texture for work on softer metals, producing special finishes and for applications where the coarser wheel might not be suitable.

Brightboy STANDARD

Brightboy STANDARD texture is a favorite for burring, finishing and polishing on the widest variety of metals and metal parts.

BRIGHTBOY INDUSTRIAL DIVISION, Weldon Roberts Rubber Co., Newark 7, N. J.

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Brightboy

Production ✓

Rework ✓

SAVE ON BOTH
with Oilstone Files

Production deburring is simplified and speeded up with oilstone files. Precision parts rejected for scratches or burrs can be quickly reworked within tolerance, even after hardening, with these "all abrasive" files.

You'll find oilstone files are *all file,* not just a surface of tiny cut teeth. Continued use constantly exposes new cutting points. Abrasive files cut hardened parts just as easily as abrasive wheels cut hardened tool steels.

India (aluminum oxide, oil filled) and Hard Arkansas (natural abrasive) Files, offer you a complete size and shape range of over a hundred items, with a finish spread from coarse, medium and fine India to the surgical fineness of Hard Arkansas.

Ask your Behr-Manning Field Engineer or your friendly distributor salesmen about them and write for your copy of our new 14″ x 18″ color chart, "Industry's Oilstones."

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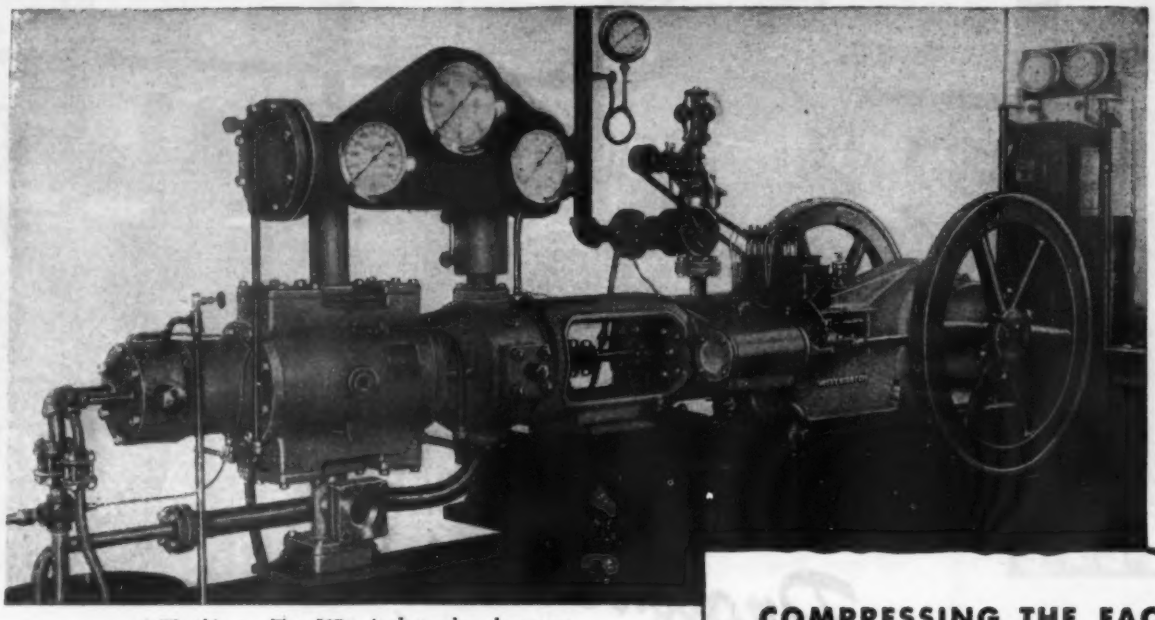
BEHR-MANNING • TROY, N. Y.

(DIVISION OF NORTON COMPANY)

Also Reliable Coated Abrasives Since 1872

HIGHER PRESSURES AT LOWER COST



A Worthington Type HB3 single tandem three-stage compressor as installed in an important chemical plant.

With 2 Exclusive Worthington Compressor Advantages

No other three-stage high-pressure compressor can offer you these advantages:

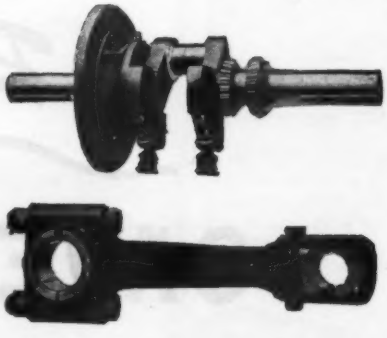
1. *Only one stuffing box*, and that subjected only to moderate pressures, minimizes leakage, so important when compressing costly or inflammable gases. Minimizes maintenance, too.

2. *Requires 20% less floor space*. Compact, without any distance pieces, the HB3 costs less in floor space and foundations than any other compressor of its kind.

Write: Worthington's Publications Department, Harrison, N. J. for Bulletin L-611-B12B, describing Worthington's exclusive Feather* Valves . . . automotive-type bearings and rods . . . steam and motor-driven HS and HB 3-stage models. *Worthington Pump and Machinery Corporation, Buffalo Compressor Division, Buffalo, N.Y.*

*Reg. U.S. Pat. Off.

COMPRESSING THE FACTS



Worthington was first to use time-saving automotive-type bearings and rods on compressors, instead of old-fashioned wedge-adjustable design. *In 8 years of use, replacement of bushings has averaged only 1/10 of 1% in all HB machines installed!*

WORTHINGTON *BEHIND THE NAME* WORTHINGTON

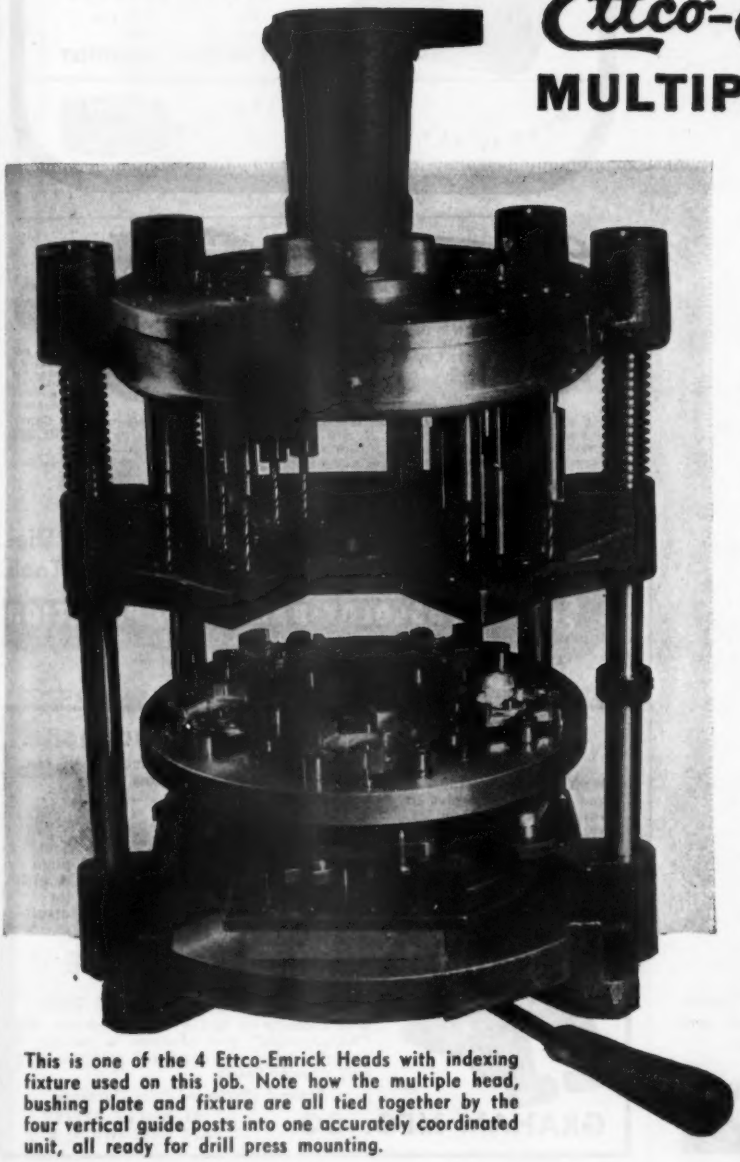
NO OTHER COMPRESSOR WILL OUTPERFORM A WORTHINGTON

Believe it or not—

18 Drilling, 27 Countersinking, 3 Counterboring and 12 Tapping operations — in 90 seconds

by the

Ettco-Emrick System of MULTIPLE SPINDLE HEADS



This is one of the 4 Ettco-Emrick Heads with indexing fixture used on this job. Note how the multiple head, bushing plate and fixture are all tied together by the four vertical guide posts into one accurately coordinated unit, all ready for drill press mounting.

These 60 high-precision operations on the die-cast aluminum body and cover—some of them on each side of each part — are done on standard drill presses in 4 passes with 4 Ettco-Emrick Multiple Spindle Heads with Ettco-Emrick indexing fixtures, all made for the job from stock items. Keeping fixtures loaded and working the press handles is all the operators do. All locating, clamping and releasing of parts is automatic.

Compare the 90 seconds per body and cover with the time it would take to do these 60 operations the single spindle way, and you can see why the nominal tool cost of Ettco-Emrick Multiple Heads pays for itself over and over again on any large volume of parts — particularly where schedules must be met.

If you have any small parts requiring multiple drilling or tapping it will pay you handsomely to consult Ettco before you go ahead. Send a sample or drawing for recommendations and estimates.

ETTCO TOOL CO.

590 Johnson Ave., Brooklyn 6, N. Y.

Over 25 years specialization in solving industry's drilling and tapping problems

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WHY MAKE YOUR OWN BORING TOOLS?

Why do things the hard way? It's not necessary today! Here! Take these boring tools

RELIEVE YOURSELF OF A LOT OF BOTHER

They're all ready to use. They are single point boring tools —designed to retain the same cutting angle despite repeated resharpenings.

This angle remains undisturbed because of the helical backed-off form of the tool. Consequently, resharpening is done on face only and clearance never disappears.

Here's a tool with high production efficiency because of its free cutting action and minimum down time.

STYLE A for boring through holes.

STYLE B for boring blind holes, bottoming and facing.

STYLE C for internal threading.

Send for catalog that shows all sizes and prices. Ask for No. K-1139 for super high speed tools and for No. K-398 for carbide tipped tools.

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Keeps pace with orders, and with other stepped-up operations—when you mark with Noblewest Rapid Precision equipment. More and more manufacturers entrust their marking operations to Noblewest equipment because of its accuracy, speed and dependability—the result of long experience and continued engineering research. Why not entrust us with your marking requirements?

Accessibility. Popular Model No. 4, showing wide opening for quick feeding of shell bodies Today universally used in defense industries. Can be tooled for hundreds of applications.

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Marking Specialists Since 1904
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MARK IT BEST WITH NOBLEWEST — NOBLEWEST IMPROVED MARKING DEVICES

Famous for
- ACCURACY OF THREADS
- LOW CHASER COST
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Bulletins available: General Purpose Die Heads, Insert Chaser Die Head, Threading Machines.

See our Advt. on page 238 Jan. 18 '45, American Machinist

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Tantalum-Tungsten *CARBIDE* Tools, Blanks and Dies. *TANTUNG* Cast Alloy Cutting Tools.

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NORTH CHICAGO · ILLINOIS

Holds a wide variety of shapes

With readily insertable V and shell jaws, plus a variety of stops, guides, etc., this vise is a ready-made jig and fixture for dozens of special repeat-operation jobs. Sizes for drill press, miller, radial, planer, shaper, grinder.

Sold plain or with jig attachments

GRAHAM MULTI-PURPOSE VISE

KNURL HOLDER FITTING LATHE TURRET

With capacity up to 2½" work diameter, this "Adjust-angle" tool produces a variety of straight, spiral and checkered patterns using only straight knurls.

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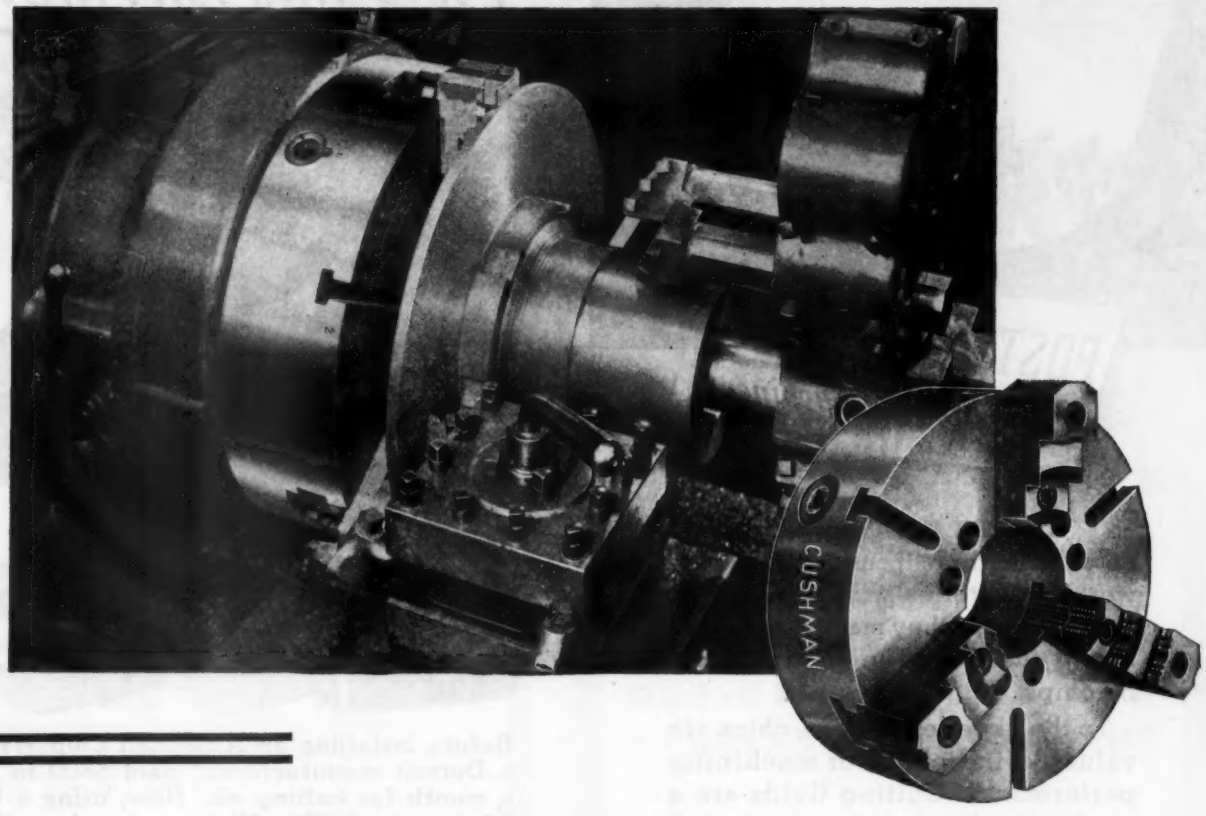
GRAHAM MFG. CO. 81 BRIDGE STREET EAST GREENWICH, R. I.

INVITE
A MACHINE TOOL BUILDER . . .
to your next POST-WAR PLANNING committee meeting



American Machine Tool Builders have done a great job in equipping all of the Allied Nations to produce for war on a scale beyond anything dreamed of five years ago. These same engineers and production planners are certainly one of our most dependable sources for real practical help in meeting the production needs of a new peace-time economy.

As a matter of fact, the American Machine Tool Builders Association and its members have already gone far with plans that are both practical and applicable to large and small shops in every branch of industry. Why not invite one or more of the builders of the production equipment now installed in your plant to sit in at your next post-war planning committee meeting? They are prepared to give you help of a very practical nature. And when you get down to a discussion of your tooling program involving new chucking equipment, call Cushman in. Our engineering department is always at your service. The Cushman Chuck Company, Hartford 1, Conn.

Send for these "Chuck Check" maintenance cards today.

A WORLD STANDARD FOR PRECISION

CUSHMAN CHUCKS

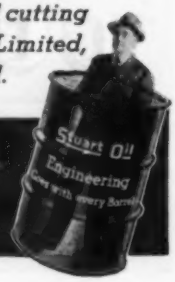
POSTWAR PRODUCT
of a million machines

AFTER V-DAY, reconversion notwithstanding, thousands of metal-working factories will turn out the same products they made during and before the War. The products will be chips.

To the experienced eye, chips are valuable indicators of machining performance. Cutting fluids are a vital consideration in developing properly formed chips—not just to "cool" the tool and workpiece, but to prevent welding of metal to tool and to lubricate heavily loaded areas. So interrelated are the factors of metal-cutting operations that slight changes in the composition of cutting fluids alone can radically alter the shape and direction of chips.

Stuart men know how to make properly balanced cutting fluids—and how to apply them for top results. Through them, 80 years of experience is yours for the asking.

The 60-page Stuart booklet, "Cutting Fluids for Better Machining," contains interesting facts about chips and cutting fluids. Write D. A. Stuart Oil Co., Limited, 2729 S. Troy St., Chicago 23, Ill.



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LIMITED
ESTABLISHED 1865
Stocks in Principal Metal-Working Centers

SAVING UP TO $705 A MONTH . . . Clear!

AND THAT AIN'T HAY!

Before installing an American Chip Wringer, a Detroit manufacturer* paid $800 to $1000 a month for cutting oil. Now, using a Model 26 American Chip Wringer, cutting oil costs average $250 to $275 a month, *or $550 to $725 less.*

Figuring 20% depreciation on an investment of approximately $1200 for the American Chip Wringer (including electric hoist), this manufacturer is *saving $530 to $705 a month clear.*

Let us show you how much money an American Chip Wringer will save *you*. No obligation. Write TODAY!

**Name furnished on request*

In less than 3 minutes, an American Chip Wringer reclaims more than 90% of the cutting oil from a load of metal chips or machine turnings. Can be operated by any unskilled person.

SEND FOR CATALOGS
Fully illustrated, describing five models of American Chip Wringers.

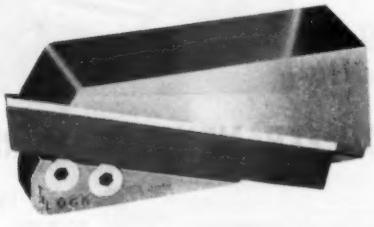
The AMERICAN LAUNDRY MACHINERY COMPANY
CINCINNATI 12, OHIO

ATTENTION! Screw Machine Operators!

BUY MORE BONDS

Put These Efficient Tools on Your Machine and See Your Production Improve

CUTTING-OFF BLADES THAT ELIMINATE EXCESSIVE FRICTION AND REDUCE DOWNTIME . . . . . .



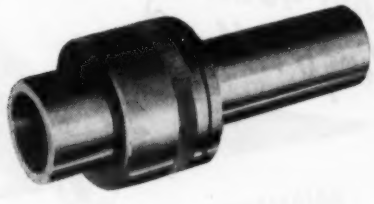
Used in holders to fit any standard hand or automatic screw machine. Trouble-less cut-off blades—provided with more-than-average clearances, so excessive friction is eliminated.

They reduce downtime because resharpening is done only on front face—even by inexperienced help—without disturbing set-up.

Rapidly becoming the most popular cut-off blade in industry. High efficiency attained through distinctive T-design. Send for literature that fully describes Empire Tool Company's Luers Patented Cutting-Off Blades. Once you try them you'll always use them.

EMPIRE TOOL COMPANY MANUFACTURES LUERS PATENTED CUTTING-OFF BLADES AND HOLDERS UNDER LICENSE ISSUED BY JOHN MILTON LUERS PATENTS, INC.

FLOATING TOOL HOLDERS THAT COMPENSATE FOR OUT-OF-PARALLEL AND ANGULAR MISALIGNMENT



You'll have no more bell-mouthed holes. Every hole you'll ream—right from the very first one—will be perfectly round—and you can stay to close limits.

The notable accuracy achieved by this holder can be attributed to the unique design which incorporates a universal float. This provides the free floating action in *all* directions to compensate for both off-center and out-of-parallel misalignment.

Composed of only five parts, the Empire Floating Tool Holder requires very little maintenance. There's nothing to get out of order—to fall out, or get lost.

Try either of these tools in your own plant for thirty days. If it does not help your production, send it back for full credit.

EMPIRE TOOL COMPANY

8774 GRINNELL AVE.
DETROIT 13, MICH.

WHERE THE ARMS OF WAR ORIGINATE

MACHINE TOOLS form the basis for a war production program. An untold number of precision drilling operations must be performed to produce superior fighting equipment. And in the tooling for this war Sibley Drilling Machines have played an important part.

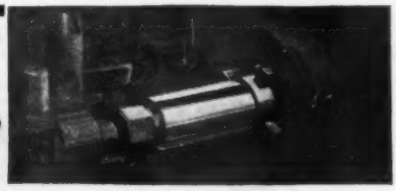
SIBLEY

MACHINE & FOUNDRY CORPORATION

SOUTH BEND 23, INDIANA

Is this YOUR Grinding Problem?
MINIMIZING LOADING AND GLAZING OF WHEELS
In wet grinding, keeping the wheel clean and free-cutting, minimizing loading and glazing, is no longer a problem with many leading concerns who years ago found the RIGHT answer to it in Oakite Grinding Coolant.
This widely used coolant, in addition, provides maximum cooling and proper lubrication, assures precision finishes, makes wheel dressing less frequent . . . conserves diamonds. Free 20-page manual gives directions for use on all types of metals. Write for your copy today.
OAKITE PRODUCTS, INC., 24 Thames St., NEW YORK 6, N.Y.
Technical Service Representatives Conveniently Located in All Principal Cities of the United States and Canada
OAKITE CLEANING

SAVE Setting-Up Time with



NICHOLSON EXPANDING MANDRELS

Set of 19 of these economy, precision tools does the work of 193 solid arbors. Hardened tool steel. 2 types, all sizes. Sold singly or in sets. Prompt delivery. Bulletin 1043.

W. H. NICHOLSON & CO., 114 Oregon St., Wilkes-Barre, Pa.

Whoever thinks of hardness testing equipment thinks of the

"ROCKWELL" HARDNESS TESTER

Now and always made only by

WILSON

MECHANICAL INSTRUMENT CO. INC.
357 Concord Ave., New York 54

An Associate Company of American Chain & Cable

HOW TO AVOID TOO MUCH DRESSING!

. . . the Fast Cool-Grinding Cortland Way

Continual need for dressing in flat grinding operations usually means that the grinding segments are not of the right specifications. For instance:

In another Cortland War Production test, in the plant of a gun maker, against a competitive product, Cortland Chucks and Segments cut the number of dressings required more than two-thirds . . . *and reduced the grinding time.* Here are the facts:

MACHINE: Blanchard Vertical Surface Grinder, #16.

WORK: Gun slide.

Rate of Feed .001"; Table Speed 29 R.P.M.

DETAIL	CORTLAND Chuck and Segments	Competitive Brand of Chuck and Segments
Table Load	31 pieces	20 pieces
Ampere readings	70 - 80	70 - 100
Dressings necessary	Av. 3	6 - 12
Work heat	No	Yes
Grinding time	1 min., 40 sec.	6 - 9 min.

Cortland Chucks and *Diagonal Shearing* Segments can usually speed your grinding operations, and give you better and more economical results. Write for latest illustrated bulletin giving all the facts about Cortland performance.

21

CORTLAND GRINDING WHEELS CORP.
5 Cortland Street **Chester, Massachusetts**

Diagonal Shearing with Varying Contact Means Better Surface Grinding

A true segment, the grinding surface has narrow ends that *start* the work with minimum shock and resistance. Straight inner edge of segment passes diagonally across work with a *shearing* action that *cuts* and *removes* the metal. Varying contact area insures longer exposure to coolant—decreases heat—reduces segment wear—conserves power.

CORTLAND
Chucks and Segments

You'll Never Have to Run an Ad Like This as Long as There's

FIBREEN

WANTED

We are in the market for a tough, weather-proof, moisture-proof, dirt-proof wrapping paper. It must assure arrival of shipments at destination in satisfactory condition despite exposure and rough handling. It should eliminate concealed damage and minimize claims. It must be time-tested and proved under the most severe shipping conditions. And we should be able to buy it at a reasonable price. Address replies to "Any Progressive Manufacturer," U. S. A.

Here are a few of the Main Fibreen Uses

Wrapping for open car shipment — lining crates, cases, bags, and cars — reduce cases to crates — crates to packages — wrapping small, large, heavy or light rolls, bales, etc. — for LCL, express and carload shipments. In addition, use it to protect machinery, parts, and materials stored outdoors.

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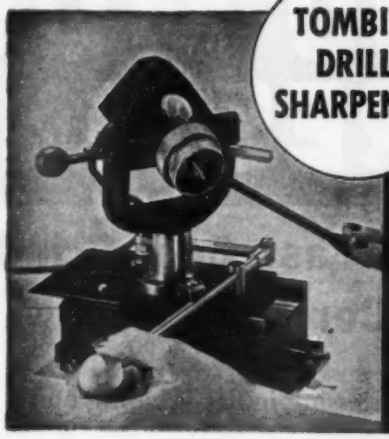
205 W. WACKER DRIVE · CHICAGO 6, ILL.
NEW YORK · SAN FRANCISCO · LONDON · SYDNEY
In Canada Write to Alexander Murray & Co., Limited, at Montreal, Toronto, Halifax, Saint John, Winnipeg, Vancouver

Manufacturers of
SISALKRAFT, FIBREEN, SISAL-X, SISALTAPE AND COPPER-ARMORED SISALKRAFT

JUST 20 SECONDS

FOR SMALL DRILLS FROM No. 70 TO 15/64"



TOMBILL DRILL SHARPENER

NEW! FAST! ACCURATE!

$134.50
With 10 Bushings

Tombill Drill Sharpener is speedy and economical. An inexperienced operator can grind exactly the right degree on drills from No. 70 to 15/64". Write for folder.

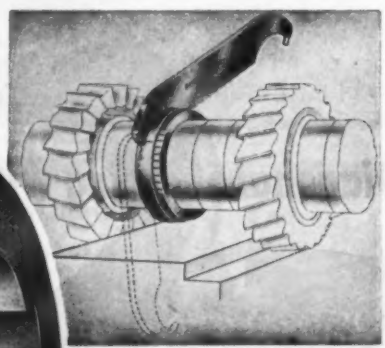
MERCURY PRODUCTS CO.
423 EUCLID AVENUE
CLEVELAND 14, OHIO

SAVE TIME ON YOUR GANG MILLING SET-UPS

You are assured FAST—ACCURATE spacing on all side milling cutters and gang milling setups with

DAYTON ROGERS ADJUSTABLE SPACING COLLARS

Just loosen cutter arbor nut and make plus or minus adjustment with handy wrench as shown.



"DAYTON ROGERS" ADJUSTABLE SPACING COLLARS are graduated in thousandths, with plus or minus markings as illustrated. A .0005 adjustment can easily be made by visual calibration. These collars are made in 12 standard sizes from 7/8" to 2".

Write for illustrated bulletin $120-1

DAYTON ROGERS MFG. CO.
2965 12th Ave. S. Minneapolis, Minn.

Keep Diamond Temperature

Below the Danger Line

with JKS STA-KOOL HOLDERS

Dressing a wheel at a mile-a-minute speed generates a terrific heat in the diamond tip of a dressing tool. Whether or not the stone becomes red hot, heat can play havoc with a diamond — cause checking and reduce strength even after proper resetting.

In a single point diamond tool . . . where four-fifths of the stone is generally set below the surface collecting heat and transmitting it to the holder . . . the J. K. Smit & Sons patented STA-KOOL holder removes all possibility of damage from overheating. Its internal ducts and fins allow quantities of coolant to pass around, through and under the metal setting. Setting and enclosed portion of the diamond are efficiently cooled. Excess heat created in the diamond point has no chance to accumulate inside the tool, but instead is dissipated in the larger cooled portion of the stone and setting. With proper use of the correct size STA-KOOL tool for the job, temperatures never rise above the Danger Line. Specify STA-KOOL holders . . . available for all makes of machines.

ARMY E NAVY

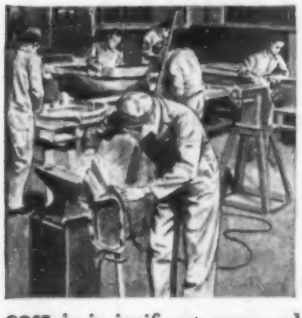
J. K. SMIT & SONS, Inc.

157 Chambers St., New York 7, N.Y. 6400 Tireman Ave., Detroit 4, Mich.

DIAMOND WHEELS • TOOLS FOR DRESSING WHEELS • CORE BITS • METAL WORKING TOOLS • POWDER

2-Ton Air Express Shipments Avert Lay-off of 600 men.

SIX HUNDRED hard-to-get skilled workers are assembled for an experimental war production job. The supplier of special fasteners needed for the job can deliver only a limited number at a time. Does this mean a lay-off? No. The manufacturer orders a steady day-by-day flow of the units via Air Express to meet daily requirements and until there's a backlog in the warehouse.



COST is insignificant compared with results achieved ($800 Air Express charges for thirty different shipments totaling two tons). Over 600 men are kept steadily at work — also avoiding other shut-down losses.

SHIPMENTS, large and small, are often delivered *same day* as ordered from points 500 to 1,500 miles away. When time means money, Air Express saves both. Every business can use this *fastest delivery* with economy.

Specify Air Express — Low Cost for High Speed

25 lbs., for instance, travels more than 500 miles for $4.38, more than 1,000 miles for $8.75, more than 2,000 miles for $17.50, at a speed of three miles a minute — with cost including special pick-up and delivery in all U.S. cities and principal towns. Same-day delivery between many airport towns and cities. Rapid air-rail service to 23,000 off-airline points in the United States. Direct service to scores of foreign countries.

AIR EXPRESS

AIR EXPRESS

GETS THERE FIRST

Write Today for "Quizzical Quizz," a booklet packed with facts that will help you solve many a shipping problem. Railway Express Agency, Air Express Division, 230 Park Avenue, New York 17. Or ask for it at any Airline or Express office.

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Representing the AIRLINES of the United States

PALMGREN

ANGLE—DRILL PRESS—PRODUCTION VISES

No. 000 ANGLE VISE

Mounted on Swivel "M" Base

For Drilling, Milling, Grinding, Filing, Fitting, Etc. Permits setting up of angle work accurately and quickly without clamps, wedges or make-shift methods. Accurately graduated for all angles, once set it stays locked. Precision machined of semi-steel casting. Jaws are hardened steel—plain or grooved. Sizes 1½" to 8".

HEAVY DUTY PRODUCTION VISES

For fast, heavy work. Adjustable cam locking lever. Movable jaws, hardened and ground. Sizes 3" to 8" Jaws.

FLANGED MILLING MACHINE VISE

Clamps to table of milling machine, grinder, etc. For heavy work. Has hardened and ground jaws 6" wide, 2" deep.

DRILL PRESS VISES

For every purpose. Accurately machined, best semi-steel castings. Long bearing adjusting screw. Jaws hardened steel—plain or grooved. Sizes 1½" to 4".

No. 250 MILLING ATTACHMENT VISE

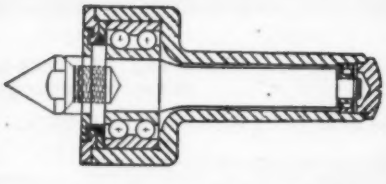
MAKES MILLING OPERATIONS POSSIBLE ON LATHE

A necessary fixture for small shops and emergency work in large shops. Fits 8"-9"-10" South Bend, Atlas, Craftsman, Sheldon or other lathes of similar sizes. Has graduated vertical angle adjustments. Easily mounted on cross slide and held by one T-Slot bolt. PALMGREN VISE has 2½" Jaws opening full 2½". Depth Jaw 1-7/16", one plain and one grooved jaw for holding round pieces. Height 10½", Price $24.75.

WRITE FOR CIRCULAR 348. Contains full description and prices of our complete line of vises.

CHICAGO TOOL and ENGINEERING CO.

8354 South Chicago Avenue Chicago 17, Ill.



POINTS RUN TRUE

and stay true because center runs on double row angular contact preloaded precision bearing at front end and on stabilizing precision roller bearing at back end.

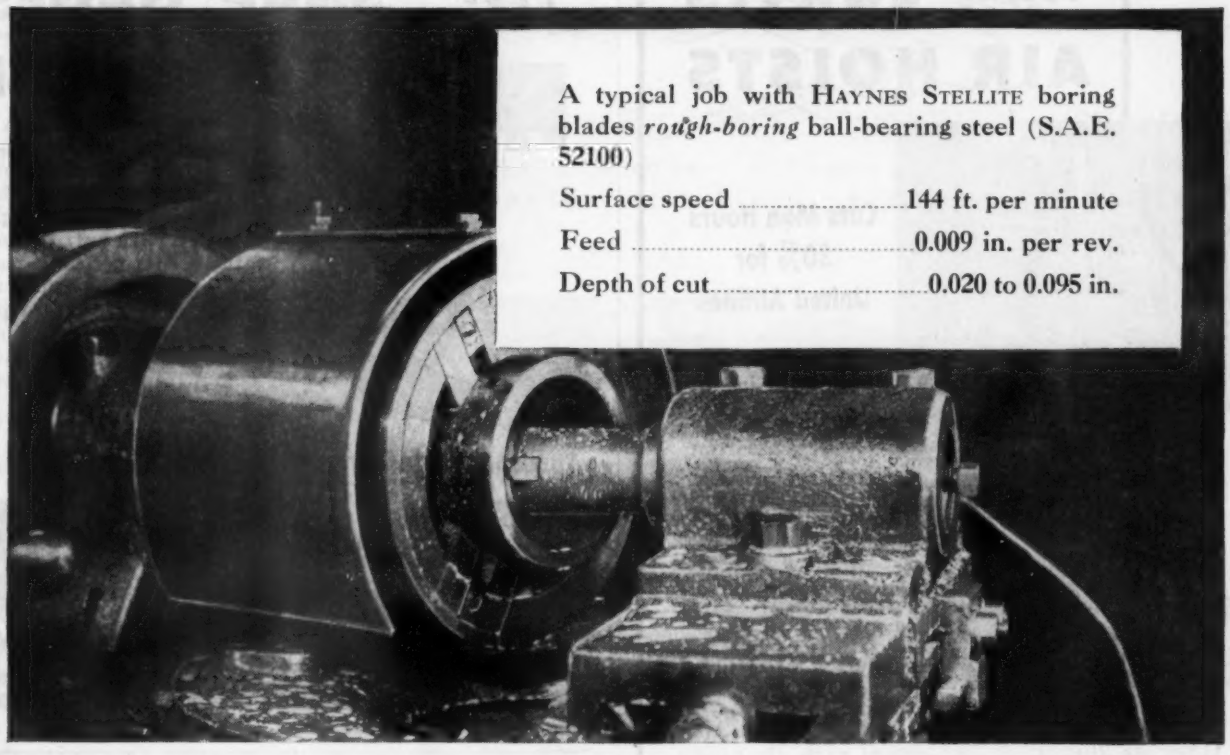
Write for complete catalog A 44.

The READY TOOL CO.

IRANISTAN & R. R. AVENUES

BRIDGEPORT . . . . . CONN.

For High-Speed Boring and Reaming Use HAYNES STELLITE *Blades*



A typical job with HAYNES STELLITE boring blades *rough-boring* ball-bearing steel (S.A.E. 52100)

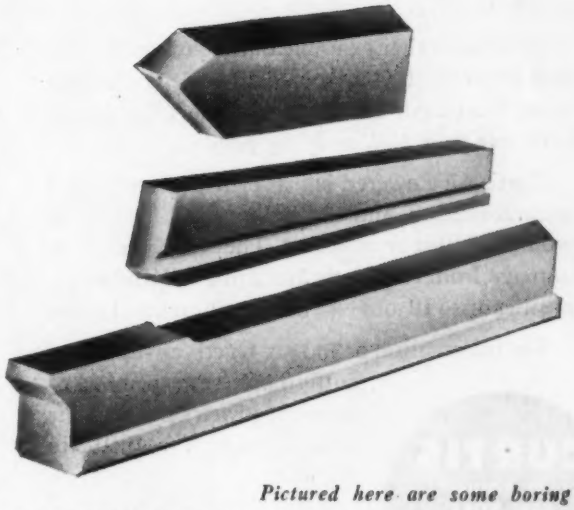
Surface speed	144 ft. per minute
Feed	0.009 in. per rev.
Depth of cut	0.020 to 0.095 in.

Rough-boring and reaming of cast iron, malleable iron, brass, bronze, and steel is possible at high rates of metal removal when HAYNES STELLITE boring or reaming blades are used.

Because HAYNES STELLITE cobalt-base alloys are hard at red heat, high surface speeds and deep cuts are possible, and blades made from these alloys are tough enough to be used on intermittent cuts.

HAYNES STELLITE boring and reaming blades are available as castings only, or finish-ground to whatever tolerances are required. They can be supplied in the HAYNES STELLITE alloy best suited for the job. Send a working drawing for price quotations.

BUY UNITED STATES WAR BONDS AND STAMPS



Pictured here are some boring and reaming blades made from HAYNES STELLITE *alloys.*

HAYNES STELLITE TRADE-MARK

HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

New York 17, N. Y. UCC Kokomo, Ind.

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ARMY E NAVY

• HIGH-PRODUCTION METAL-CUTTING TOOLS •

"Haynes Stellite" is a registered trade-mark of Haynes Stellite Company.

NEW PARTS CLEANING PROCESS Using CURTIS AIR HOISTS

Cuts Man Hours 30% for United Airlines

United Airlines removes dirt and grease from engine parts by dipping into a vat of cleaning fluid on a grated floor tray. The raising and lowering operation is controlled by a CURTIS Air Hoist, as illustrated. The use of such cleaning trays has resulted in man-hour savings of as much as 30%.

Here is another example of the savings in time and labor that you, too, can achieve through using Curtis Air Hoists or Cylinders for practically *any push, pull, or lifting problem.*

Curtis Air Powered Hoists provide faster, more accurate lifting, and can be operated by men or women, skilled or unskilled. They are immune to damage from overloads and are available in capacities up to 10 tons—pendant or bracketed types.

For information as to how Curtis air-operated equipment can speed production, lower costs in your plant, write for Bulletin A-4-B.

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OF CURTIS MANUFACTURING COMPANY
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Tubular SNAP GAGES

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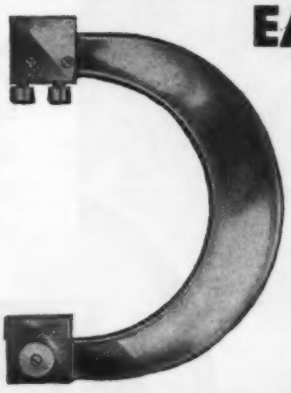

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FLEXIBLE SHAFT MACHINES

VERTICAL AND HORIZONTAL TYPES
⅛ to 3 H.P.

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¼ to 1½ H.P.

ONE HUNDRED TWENTY-FIVE TYPES and SIZES

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⅛ to ½ H.P.

HIGHEST QUALITY MACHINES
HIGH SPEED STEEL ROTARY FILES . . . ROTARY CUTTERS

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Largest Flexible Shaft Line in the World

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FREE MACHINING STAINLESS BARS

Accuracy of analyses distinguishes all Midvale steels. This is especially important in the free machining stainless alloys being used today for so many small instruments and parts, which must be machined in large quantities at high speeds. Midvale free machining stainless steel bars are the product of experience in making fine bar steel since 1876.

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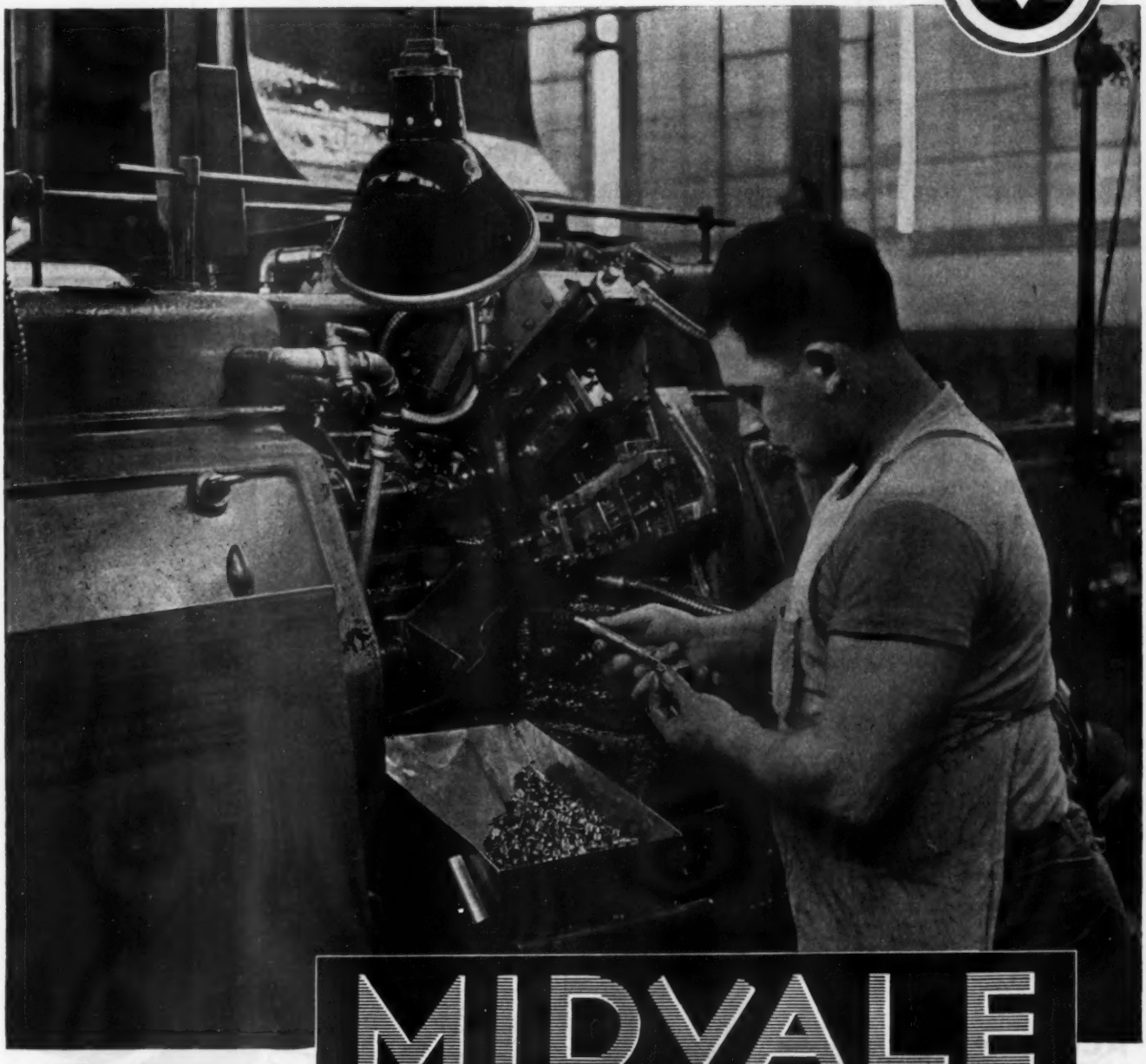

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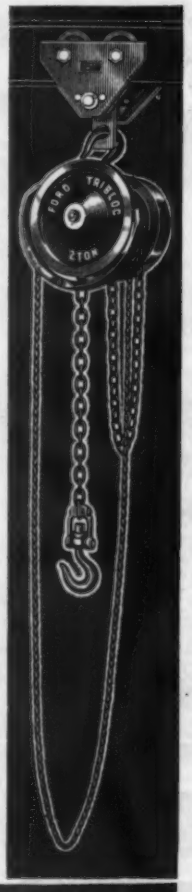
Custom Steel Makers to Industry

FORD TRIBLOCS

...smooth in operation

The **FORD TRIBLOC** is as smooth in operation as the panther. It is easy to operate, extremely durable, low in maintenance cost. For the plant man this means safety, dependability and efficiency.

FORD TRIBLOCS are ideal for constant hard usage. Spur gear construction, ball-bearing load wheels, both high tensile strength and elasticity in load chain, and many other features assure enduring efficiency. Capacities: ¼ to 40 tons.



FORD SCREW GEAR HOISTS are used where smoothness in lifting and lowering of loads is desirable and where portability is essential. Lightweight: highly portable. Capacities: ½ to 10 tons.

FORD DIFFERENTIAL HOISTS are constructed for relatively light service where speed, portability and low price count. Capacities: ¼ to 2 tons.

Order from Your Distributor

ACCO Philadelphia, Chicago, Denver, Los Angeles, Portland, San Francisco, Bridgeport, Conn.

FORD CHAIN BLOCK DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK *In Business for Your Safety*

FOOT POWERED
SHEAR CUTS COSTS

- ✓ **SMALL INVESTMENT** First Cost Is Only Cost
- ✓ **NO OPERATING EXPENSE** Except for Labor
- ✓ **SIMPLE TO INSTALL** Unpack and Start Shearing
- ✓ **EASY GAUGE SETTINGS** Simple, Fast and Sure
- ✓ **ACCURATE SHEARING** Cross Head Reinforced
- ✓ **EFFORTLESS OPERATION** With Balanced Leverage

Famco FOOT POWERED Squaring Shears cut up to 18 gauge mild steel with ease. Made in five sizes . . . 22″, 30″, 36″, 42″ and 52″ cutting widths (three largest have "hold down" attachment). The knives of all models have tool steel cutting edges. Compression springs are encased against breakage. Furnished with front, side and back gauges. Write today for full information on the Famco line of low cost Squaring Shears.

POWERFUL PRESSES THAT NEED NO POWER

Famco Foot Presses, made in 10 models (bench and floor stand types) are widely popular for light forming and stamping operations.

Famco Arbor Presses deliver up to 15 tons pressure without power cost. Make assembly or dismantling easy. 32 models, in bench or floor types.

FAMCO MACHINE COMPANY, 1316 18th STREET, RACINE, WISCONSIN

famco ARBOR PRESSES
FOOT PRESSES
SQUARING SHEARS

That's right. The AIR-MASTER is not human particularly when it concerns those destroyers of health and machinery—dust and grit. The AIR-MASTER sucks up those tiny demons of destruction right at the moment they fly off the whirling wheels of grinders and buffers. Never gives them a chance to get into the air—to injure the lungs of your employees—to harm sensitive mechanisms of fine machinery.

To master dust and grit, install the AIR-MASTER. Fully self-contained—efficient, rugged, dependable. A size for every grinder and buffer. Write for full details.

NOW AVAILABLE—Two, Three and Five H.P. grinders and buffers on AA5 priority or better.

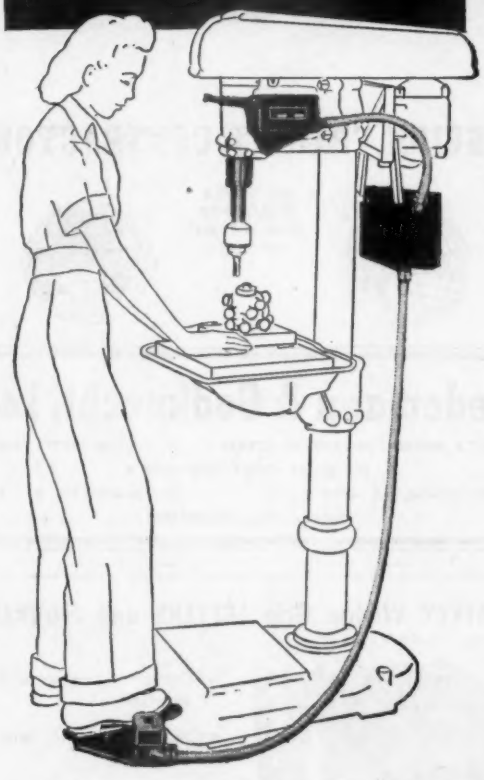
The Cincinnati

ELECTRIC DRILLS • GRINDERS • BUFFERS • PORTABLE TOOLS

The Cincinnati Electrical Tool Co. 2615-9 Madison Rd.

DIVISION OF THE R. K. LEBLOND MACHINE TOOL CO., CINCINNATI, OHIO

CLASS 3 THREADS with your STANDARD DRILL PRESS



Rotorex Precision Tapper

CONVERTS YOUR DRILL PRESS TO A PRECISION TAPPING MACHINE

The attachment may be installed and removed in a matter of minutes.

CHECK THESE FEATURES:

1. Positive and Automatic Control of Lead.
2. Hardened and Precision Ground Lead Screws.
3. Instantaneous Emergency Reverse.
4. Complete Automatic Cycle.
5. Accurate control of depth. Accuracy to .010".
6. Foot control of tapping cycle leaves Operator's hands free for loading work.
7. Capacity 5-40 to 7/8".
8. Minimum of investment—COMPLETE ATTACHMENT $175.00.
9. Adaptable to Atlas 15", Boice Crane 15", Buffalo #15 and 18, Canedy Otto 16 and 18", 14 and 17" Delta, Walker-Turner 15 and 20".

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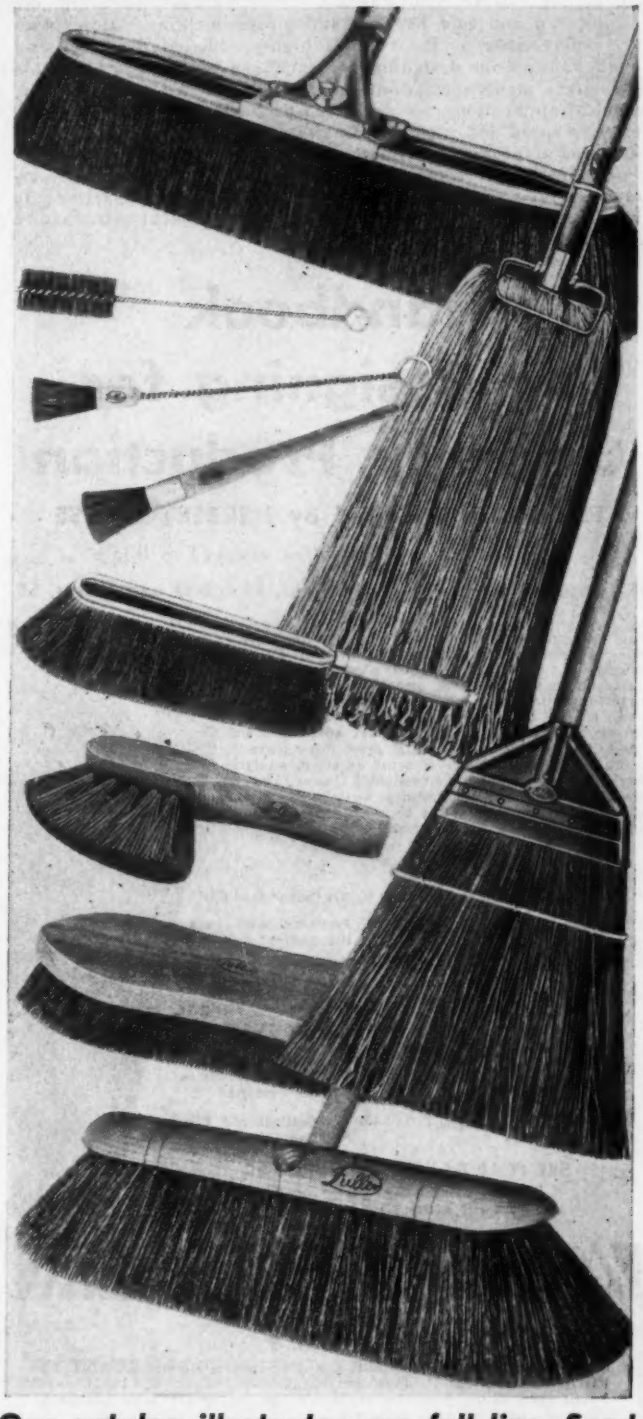
150 BROADWAY · NEW YORK, N. Y.

Famous Fuller Brushes for the AMERICAN MACHINIST

These efficient cleaning tools are designed to meet the needs of your plant. Each Fuller product represents the best in materials and workmanship.



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THE FULLER BRUSH COMPANY
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TO HELP YOU

in designing basic parts for quantity production

Written by seven authorities, this book gives a completely practical treatment of the design of basic parts for quantity production by die casting, sand casting, screw machine, stamping, die forging, hot and cold heading and plastic molding. Along with full explanations of the various high-production processes and sound pointers on designing for each one of the processes, the book gives many specific rules, amply illustrated to show their practical applications, for designing products that will lend themselves to rapid and economical mass production. In Part II various types of products manufactured in quantities at moderate or minimum cost are compared, one against the other, in many instances with actual production costs and tabular comparisons, to show the type of design best adapted to economical manufacture in various specific instances.

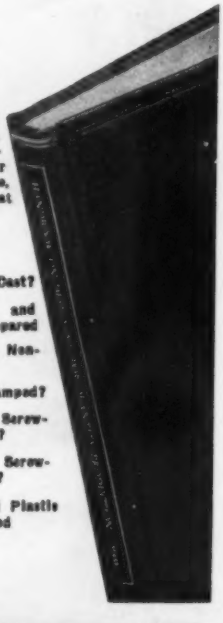
Handbook on Designing for Quantity Production

Prepared and Edited by HERBERT CHASE

Associate Editor of *Aviation*, assigned to *Wings*

517 pages, 5½x8½, 351 illustrations, 54 tables and charts, $5.

Now you can avoid the necessity for redesign. Not only will you be able to form the original design quicker, but now you can be sure to make it thoroughly useful for more economical production in large quantities. We ask that you use the book once, for an invaluable design pointer on materials, for exact design considerations—actual advantages and drawbacks—for the various high-production processes, or for one of the hundreds of newly advanced, straightforward rules to follow in designing basic parts for the different quantity production processes. Use it once, and then decide whether this book will remain right at your fingertips for instant reference.



Chapters

1. Design of Die Castings
2. Design of Sand Castings for Quantity Production
3. Design of Screw Machine Products
4. Design of Stampings
5. Design of Die Forged Parts for Quantity Production
6. Notes on and Accomplishments in Hot Heading
7. Notes on the Design of Cold-headed Parts
8. Design of Plastic Moldings for Economical Quantity Production
9. Die Cast or Sand Cast?
10. Permanent-mold and Die Castings Compared
11. Which Type of Non-ferrous Casting?
12. Die Cast or Stamped?
13. Die-Cast or Screw-machine Products?
14. Cold-headed or Screw-machine Products?
15. Die Castings and Plastic Moldings Compared

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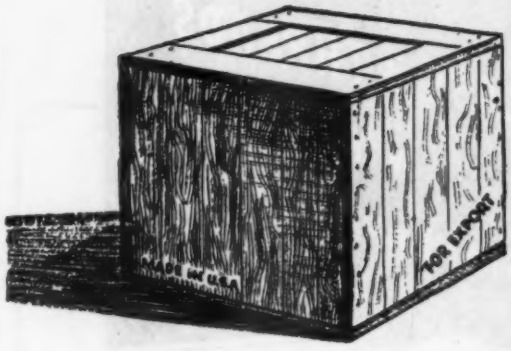

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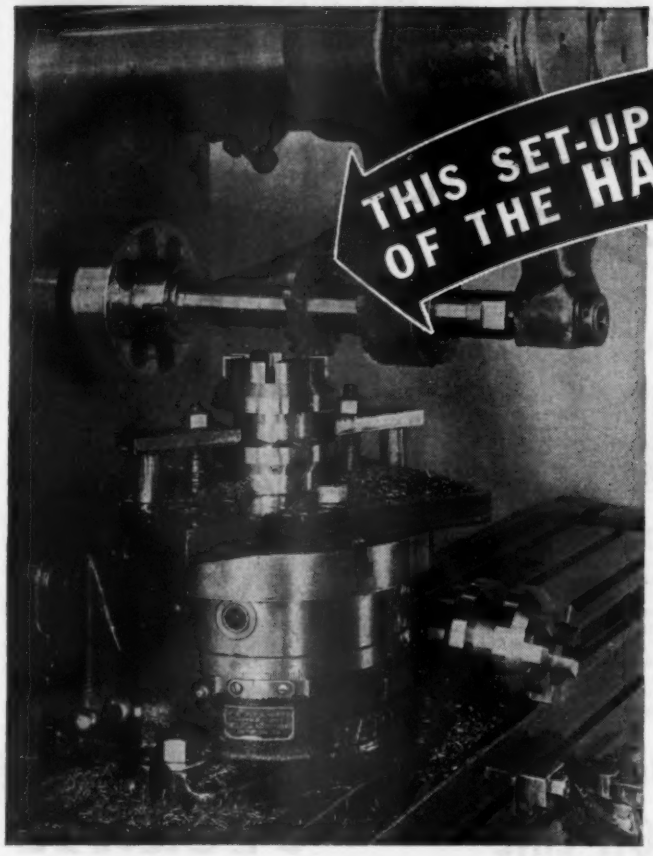

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NO BLOWER or POWER NECESSARY
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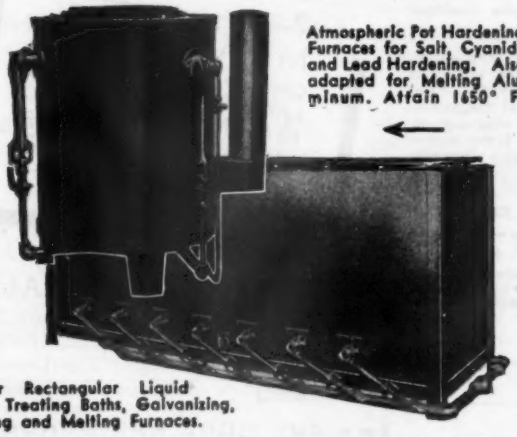

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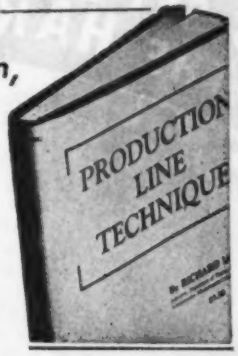

This book gives you the fundamentals of production line technique—how it differs from job-lot manufacture, its advantages and limitations, how production lines may be set up and successfully operated in medium-sized industries. Based on first-hand field investigations of current practices in many manufacturing plants. A sound, practical guide to the steps to follow in design, procedure, equipment, and maintenance of production lines . . . the pitfalls to avoid . . . and the special features to consider, in establishing smooth-running, well-balanced, *profitable* production lines.

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First-hand experience and observation of procedures both here and abroad make this book a mine of practical information on design and process engineering, layout and equipment, line balance and flow of material, production controls, and flexibility of layout and equipment. Fully illustrated by actual examples and procedures. Shows in detail how to establish and maintain line production in a variety of industries—to get the smooth, balanced line, steady flow of material, and effective use of men and materials essential for low cost, high volume, precision production.

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This book brings the principles and application methods of this fast, steady controlled technique of *paced production*—proved so vitally important in the war effort—within the reach of the small-plant manufacturer. There will be an ever-increasing demand for precision products at lower cost—be prepared, now, with the facts on this dynamic, stream-lined technique.

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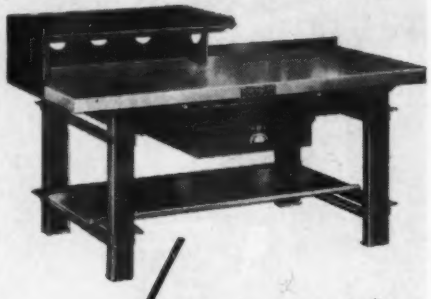

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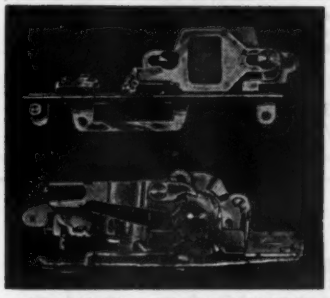

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(Additional Contract Work Advertising on Page 350)

SEARCHLIGHT SECTION

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ENGINEERS MACHINE DEVELOPMENT

Graduate engineer or equivalent, experienced in the design and development of special and experimental machines. Men with creative ability required, experienced in such lines as automatic, semi-automatic, or ordnance equipment. Must be thoroughly acquainted with modern methods and shop practices and capable of developing new ideas in conjunction with modern mechanical laboratory facilities.

State age, marital status, details of education, experience, draft status, present salary and salary expected. Enclose recent photograph or snapshot.

Post-war opportunity.

Applicants must be able to obtain Statement of Availability.

E. I. du Pont de Nemours & Company, Inc.
Personnel Division
Wilmington 98, Delaware

WORKS MANAGER WANTED

Company normally employing 1100 is looking for a capable Works Manager.

Essential requirements are a sound engineering background and experience in building high grade medium and heavy machinery.

He should have the ability to plan and direct quality production, secure results economically and have the knack of getting others to work with him and for him. His own enthusiasm should be contagious.

An old established Company with progressive policies and modern plant has a real opportunity and future for the right man. Company at present 100% in war work but has standard line of pre-war nationally recognized products for post-war years.

Write full details as to experience, etc. including earning record. Correspondence considered in confidence, with no references contacted without first being released by you.

P-237, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

METAL SPECIALIST

Well-known national concern manufacturing materials used in processing, maintenance and cleaning operations has opening for man who has had good experience in problems of metal shaping, forming and finishing operations. Splendid opportunity now and in post-war period. Location New York, some traveling. Please give comprehensive details of age, experience, salary, etc. If data indicates necessary experience, interview will be arranged at our expense.

Box 567, Church St. Annex, N.Y.P.O.

WANTED
PRODUCTION MANAGER

Thirty to forty-five years old. Must have successful production record. Midwest firm with forty years background has capacity orders for postwar manufacturing of our regular line of precision made construction and mining tools. Give age, experience and minimum salary expected.

P-243, AMERICAN MACHINIST
520 North Michigan Ave., Chicago 11, Ill.

WANTED
ASSISTANT PLANT ENGINEER

30-40 Mechanical graduate preferred with executive ability. Should have previous experience in Plant Engineering and maintenance. Should be familiar with power plant and machine shop operation. Location: Massachusetts.

State age, experience, details of education, draft status, present salary and salary expected. Post-war opportunity. USES certificate of availability and Draft Board clearance necessary. Send photograph.

P-252, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

WANTED
MACHINE DESIGNER

Graduate engineer 30-40 for design and development of Textile machinery. Should have previous development experience on existing and new machines. Should be acquainted with modern shop practice and methods. Ability to supervise group of designers and draftsmen necessary. Location: Massachusetts.

State age, experience, details of education, draft status, present salary and salary expected. Post-war opportunity. USES certificate of availability and Draft Board clearance necessary. Send photograph.

P-253, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

OPPORTUNITIES FOR MECHANICAL ENGINEERS

Tool and Die Design and Methods Engineer for production of light sheet metal and small precision products.

Development and Design Engineer for small precision mechanical products.

Immediate efforts on War Products. Assured continued Post War Employment on established products.

Must comply with WMC Regulations.

P-256, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

CONTRACT WORK

(Continued from page 349)

SENIOR TOOL ENGINEERS
CHIEF TOOL DESIGNER

Openings in Detroit & East. Postwar future. Large engineering firm. Give complete details in reply.

P-255, AMERICAN MACHINIST
520 North Michigan Ave. Chicago 11, Ill.

ENGINEERING AVAILABLE

LARGE FIRM HAS TIME AVAILABLE IN ENGINEERING DEPARTMENT, DUE TO WAR CUT BACK. CAN HANDLE TOOL AND PRODUCT DESIGN; DEVELOPMENT WORK AND DRAFTING. STAFF OF 200 MEN; EXPERIENCED ON MANY DIFFERENT PRODUCTS. WILL CONSIDER CONTRACT PRICE OR TIME AND MATERIAL BASIS. CHICAGO AND NEW YORK DIVISIONS.

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PREFER man about 40 with SOME PRACTICAL ENGINEERING EXPERIENCE. Position consists of preparing Booklets dealing with Lubrication of various types of machinery. PERMANENT POSITION. Major Oil Co. Located in N. Y. C.

STARTING SALARY $5000

Give full details including Age, Experience, Education.

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1475 Broadway New York 18

POSITIONS VACANT

MECHANICAL ENGINEER—Old established company now converted to pre-war production (essential products) has opening for mechanical engineer with some machine design, factory lay-out, and installation experience. Excellent future possibilities. Give complete details of personal qualifications and work history in letter of applications. P-205, American Machinist, 330 W. 42nd St., New York 18, N. Y.

WANTED: Die shop foreman, die sinkers and maintenance men. Salary negotiable according to qualifications. Statement of availability required. P-245, American Machinist, 330 W. 42nd St., New York 18, N. Y.

SUPT. LARGE metal stamping plant. Ohio location. Porcelain enameled ware and cooking utensils. Give fully age, experience, references, salary expected. P-275, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

WANTED SUPERINTENDENT or Works Manager small plant building machine tools. Opportunity for young man to demonstrate ability and acquire good income for post-war. Location within 150 miles of Cincinnati. State experience, starting salary and particulars of education, training, etc. Confidential. P-276, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

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SALARIED POSITIONS—This advertising service of 35 years recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Identity covered and present position protected. Send for details. R. W. Bixby, Inc., 366 Delaware Bldg., Buffalo 2, N. Y.

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TOOLROOM FOREMAN, long and varied experience metal stamping work, prefer a southern or western location. PW-280, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

INDUSTRIAL ENGINEER wants connection progressive concern. Twenty years' experience metal fabrication industry. Competent in tool design, production, plant layout. Long or short time arrangement. Available soon. Address P. O. Box 4713, Station E, Kansas City, Mo.

REPRESENTATIVE WANTED

WANTED: MANUFACTURER'S representative to handle a line of made to order hardware and metal stampings to the railroad and railroad car builders trade. Railroad connection desirable. Dayton Rogers Manufacturing Co., Minneapolis 7, Minnesota.

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SALES REPRESENTATIVE—Age 44, available for immediate placement. Desires permanent full-time position as sales representative with company supplying automotive industry. Twenty-three years' experience selling in Detroit area. Well acquainted in automotive industry. Excellent references. Immediate action necessary to present products for post-war production. SA-278, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

(Continued on page 351)

(Continued from page 350)

REPRESENTATIVES AVAILABLE

TOOL LINES wanted: Mechanical engineer, 9 years' experience as process engineer, 7 years manufacturing supervision; desires several small tool lines. Midwest territory preferred. Exceptionally good contacts in automotive industry. RA-264, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

MANUFACTURER'S REPRESENTATIVE covering Northern New Jersey and Metropolitan district, selling high class machine tools wants additional lines of machine shop equipment or tools to sell. Practical experience, technical, can demonstrate machine tools. RA-279, American Machinist, 330 W. 42nd St., New York 18, N. Y.

FOREIGN SALESMAN available. French tools sales firm in Paris. Long known in all French industry wishes to represent American manufacturers for the following: Lathes and universal chucks—electric and pneumatic portable tools —electric motors from 1/3 HP to 5 HP—abrasive papers for all materials. RA-281, American Machinist, 330 W. 42nd St., New York 18, N. Y.

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Here is a real opportunity for a young man (under 30) to establish himself with a new division of a nationally-known organization. If you are sales-minded and have had some engineering experience in the metallurgical, aircraft or automotive fields, write today, giving full details. Better-than-average starting salary and unlimited chance for advancement.

SW-271, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

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Manufacturer's agents with experience in steel. Tool steel tubing sells to every metal working plant and many others. Heavy sales to tool and die shops. Saves time, money, labor and steel in tool manufacture. Repeat sales automatic.

RW-272, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

MACHINERY MANUFACTURERS

Serious selling organization, thoroughly familiar with United States exporting, interested representing and distributing lathes, millers, motors, grinders, tools, and other equipment. Best references available. Address:

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In Engineering, Manufacturing, Sales & Administration, we offer, AT NO CHARGE, a confidential, dignified opportunity of bringing their qualifications before interested employers.
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CURT E. PATTON PERSONNEL ENGINEERS
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WANTED
Superintendent-Foreman

Aggressive working supervisor to take charge of mechanical pencil manufacture. Experienced in machinery and dies necessary for parts. Ability to design helpful. Permanent position for post-war with established concern, located in Rhode Island. State age, experience, salary and availability. All replies kept confidential.

P-269, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

WANTED
TRANSMISSION DESIGNER

EDUCATION: Graduate engineer or equivalent experience
KNOWLEDGE: Design and engineering of various transmissions
BY WHOM: New Division of 50 year old machine tool company
MAKING WHAT: Transmissions, now and Post-War
LOCATION: Ohio Valley City

P-274, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

WANTED

Engineer experienced in developing and designing check protector mechanisms. Fine Opportunity and liberal salary for right man.

P-270, AMERICAN MACHINIST,
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WHO WANT IMMEDIATE NATIONAL
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Manufacturers' Representative now selling 300 metal working plants in Rhode Island, Massachusetts, Maine, New Hampshire and Vermont desires to secure high grade line of component parts such as stampings, die castings, screw machine parts, forgings, clutches, bearings, couplings or similar products.
Line must be capable of substantial volume backed up by close factory cooperation.
Established contacts with production executives.
This is your opportunity to secure aggressive, intelligent representation.

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RW-268, AMERICAN MACHINIST
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WE WILL BUY

a going industrial business for cash, and for our own account. Prefer a transaction involving over $100,000.00.

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LIGHT MANUFACTURING

42 TO 45 FT. WIDE
14 TO 16 FT. FLOOR TO TRUSS
500 TO 570 FT. LONG

GLOBE AMERICAN CORP.
KOKOMO INDIANA

WANTED BY
SMALL BOLT & NUT PLANT

COLD HEADERS—DOUBLE STROKE—BOLT TRIMMERS — ROLL THREADERS — SCREW SLOTTERS—#2 Surface Grinder—Power Feed
Must be late machines in excellent condition. Give full particulars, including price.

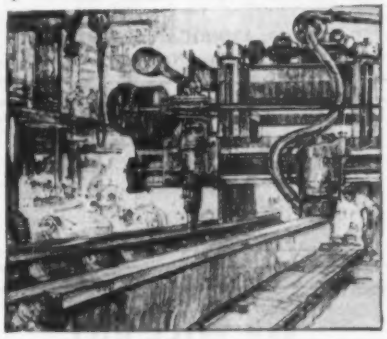
W-267, AMERICAN MACHINIST
330 West 42nd St., New York 18, N. Y.

WANTED

New or used Rotary Double Pointed Tack Machine, as manufactured by A. H. Nilson Machine Company or equal.

M. D. GIARDINO
101 PARK AVENUE, NEW YORK 17, N. Y.
LExington 2-9288

ENGINEERED REBUILDING



By Simmons

Every machine listed in this column is in our warehouse at press time.

2¼" Bar LUCAS Horizontal Table Type Boring Mill, M.D.
2½" Bar CLEVELAND Horizontal Table Type Boring Mill, M.D.
5" Bar DETRICK-HARVEY Floor Type Horizontal Boring Mill, M.D.
24" BULLARD New Era Vertical Turret Lathe
42" BULLARD, NEW ERA, 1100 serial
42" N-B-P Car Wheel Borer, M.D.
66" N-B-P Vertical Tire Mill
10' CINCINNATI Vertical Boring Mill
4' HAMMOND Sensitive Radial Drill
6' CARLTON Motor-on-Arm, Plain
7' CARLTON Motor-on-Arm, Plain
8' N-B-P Motor-on-Arm, Plain
#16 BLANCHARD Surface Grinder
33"x9" G & E Spur Gear Cutter
27" BRIDGEFORD Axle Turning Lathe
29" PUTNAM Axle Turning Lathe
42" PUTNAM Car Wheel Lathe
#2 CLEVELAND Plain Miller, M.D.
#5 B & S Plain Miller, M. D.
#6 BECKER Vertical Miller, M. D.
#10 N-B-P Heavy Vertical Miller
24"x24"x12' INGERSOLL Planer Miller
24"x36"x12' INGERSOLL Side Miller
30"x30"x10' NEWTON Slab Miller
42"x26"x12' INGERSOLL Planer Miller, Four heads, M.D.
30"x30"x12' N-B-P Planer, Two Rail Heads, 230 volt D.C.
48"x48"x24' N-B-P Planer, 3-heads, M.D.
48"x48"x32' GRAY Planer, Four Heads, 230 volt DC Reversing Motor Drive
RT-40 SCHULTZ-NAUMANN Beam Shear
5" Capacity U.E.F. Alligator Shear
72" 105 Tons L & A Multiple Punch
6"x6"x⅝" Double Angle Shear
12" SELLERS Crank Slotter
20" SELLERS Crank Slotter
2" LANDIS Pipe Threader
6" BIGNAL-KEELER Pipe Threader
30' H & J Plate Planer, M.D.

SIMMONS ENGINEERED REBUILDING

SIMMONS MACHINE TOOL CORP.
1759 North Broadway, Albany, N. Y.
N. Y. Office: 50 East 42nd St.

CLOSEOUTS

BORING MILLS
HORIZONTAL
2½", 4" Binsee
4" Landis Horiz., Floor Type, M.D.
VERTICAL
66", 120" Niles
42" Bullard, M.D., 54" Colburn, M.D., 2 hds.
TURRET LATHES
Nos. 2A, 3A W.&S., 4½" hole, M.D.
24" Gisholt, 6½" hole
Foster Nos. 4, 5, 6, 1B, M.D. Univ.
J. & L. 2¼x24", 3¼x36"
GRINDERS
P. & W. 14", 18", B.B., Vert., M.D.
Blanchard 30", M.D.; Modern 12x48", M.D.
Norton Hydraulic 12x18", M.D.
Heald Nos. 55, 70, 72A3 Gagematic, M.D.
Norton 50"x28', M.D.
Gardner 72' disc, M.D.
Landis Type A 6x20" Hydraulic, M.D.
Bryant No. 12, M.D.
Nos. 50, 55, 60 Heald Int. Hydraulic, M.D.
12" Heald Rotary, M.D.
B. & S. No. 2 Surface, M.D.
Norton 10x36" Hydraulic, M.D.
Badger 24" Dbl. Opposed, M.D.
B. & S. No. 10, 11 Cyl.
No. 2 Cincinnati, Centerless, M.D.
B. & S. No. 1, 3 Universal
LATHES
McCabe 26-42"x14'
24x12' Boye & Emmes 3 step cone, D.B.G.
20"x14' Rahn-Larmon, raised to 24"
14"x6' Hendey
9" LeBlond Automatic
36x30' Putnam, M.D.
36x30' Putnam S.C.G., D.C.M.D.
32"x35' Wickes
Putnam 42x16', M.D.
30x26' L. & S. 12 speed M.D.
84"x28' Niles-Bement-Pond, 17' centers
AUTOMATICS
B. & S. No. 2, 6, 6F Hand Screw
B. & S. No. 00, 0, 2 G
5 Spdle Davenport 9/16" cap.
Cleveland Model A ½", ⅝", 1¼", 2"
Cleveland Model B 1", 2"
Cleveland ⅞", Model M, 4 spindle
Gridley 4¼" single spindle, M.D.
P. & J. 6A, M.D.
GEAR CUTTERS
No. 2, 3, 12 Barber-Colman Gear Hobber
No. 6 Fellows Gear Shapers
B. & S. No. 3-26", 4-36"
Gleason 11" Bevel
G. & E. 60" gear cutter
SHAPERS
20", 24" G. & E.
16", 20", 26" Stockbridge
RADIALS
4', 6', 8' American Triple Purpose
3', 3½' Cincinnati-Bickford
4' Mueller, M.D.; 4', 5' Western, S.P.D.
MILLING MACHINES
Ingersoll Planer type 36x36x12' 4 hds., M.D.
10" P. & W. Auto.
No. 2A Milwaukee, S.P.D.
No. 3S Cincinnati, S.P.D. rapid trav., M.D.
Nos. 1Y, 0Y, 3, 4, 5 B & S Plain & Univ.
B. & S. Nos. 12, 13, 13B
Hall Planetary Model D Thread Miller
Providence Planer Type 32"x8'
Becker Nos. 3, AB, 5, 6 Vert.
Nos. 3, 4, Cincinnati Vert.
P. & W. No. 12, 30 Profiler, M.D.
No. 4 B. & S. Universal
Rowbottom Cam Miller
K. & T., B. & S. No. 3 Dbl. overarm, Timken Bearings
B. & S. No. 2, 3, Vert.
Milwaukee No. 2½B Vert.
MISCELLANEOUS
Gorton No. 1S Engraving Machine
6 spindle Avey Drill, 15" overhang
McCabe ½" Flanger
Rochester No. 5B Hammer
Pels 6" Vert. Shaper
Pipe Machines, 4", 6", 8", M.D.
N.B.P. 15" Slotter, M.D
Baush Multiple spindle drill
Burr Keyseater
⅝"x5' Plate Straightening Roll
4x4x⅝" Williams & White Angle Bending Roll

AARON MACHINERY CO.
MONA MEMBER
45 Crosby St.
New York 12, N. Y.

MOREY
Dependable Used Machines

BULLARD 24" Vert. Turret Lathe—with side head; R.P.
GISHOLT 42" 2-head Vert. Boring Mill—M.D.
GLEASON 3", 6", 11" Bevel Gear Generators—2 tool type
GLEASON 10" Spiral Bevel Gear Generator
GLEASON 15" Spiral Bevel Gear Generator
INGERSOLL 24" Cutter Grinder
INGERSOLL 26"x26"x12' Planer Type Miller
P. & W. 6"x14" Thread Millers
GRAY 30"x30"x8' Single Head Planer M.D.
SAUNDERS 8-18" Pipe Threader
TREADWELL 12" Pipe Machine

LATEST TYPE MACHINE TOOLS — Built in 1942

GLEASON 12" Straight Bevel Gear Generator
GLEASON 3" Straight Bevel Gear Generators
MOREY No. 2G Plain Turret Lathe—1" cap.
MOREY No. 3 Univ. Turret Lathe—1½" cap.
MOREY No. 12M 2 spindle Vertical Profiler

ALL MOTOR DRIVEN AND INCLUDING 3 phase, 60 cycle, 220 volt, A. C. motors

GISHOLT Precision Balancer
ESPEN LUCAS #138 Cold Cutting Saw—Cap. of blade 12"
SLEEPER & HARTLEY Coil Winder
CINCINNATI Gear Burnisher

THIS IS A PARTIAL LIST
Send us your specific inquiries

MOREY MACHINERY CO., Inc.
410 BROOME ST., NEW YORK

UNUSUAL VALUES

Brake, Robinson 5' toggle
Brake, Chicago steel, 3'
Drill, high speed 7' over hang single spindle
Drill, two-spindle sensitive, #1 Morse taper
Drill, 4-spindle sensitive
Gear cutter, Brown & Sharpe #3—26
Gear cutter, Gould & Eberhardt 22"
Grinder, LaSalle Surface
Hammer, 50# Bradley upright, helve
Pipe Machine 8" Oster motor drive
Planer, 30"x30"x10' Gray; 3 heads, motor drive
Planer 24"x24"x8' Pease, motor drive
Press #1 OBI motor drive
Punch & Shear two ½" & ⅝" capacity
Shaper 24" Gould & Eberhardt
Threading Machine #0 Webster & Perks
Tool Grinder Sellers new #0, #1 and #2 magic chuck and collets.

THE OSBORNE & SEXTON MACHINERY CO.
COLUMBUS, OHIO

EVERY ITEM GUARANTEED AS REPRESENTED

FALK FOR DEPENDABILITY IN REBUILT MACHINERY

MORE VALUE FOR YOUR MONEY

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EXCEPTIONAL ITEMS FROM OUR MODERN STOCK*

SHEARS & BRAKES

Lennox Splitting Shear, 8" throat, ¾" cap.
Lennox Bevel Shear, ¾" cap.
Niagara #98 Production Power Brake & Folder. 72"x14 ga. cap. Equal to new.

PRESSES

#4 Bliss D.C. B.G. Forging 4" stroke.
#4½ Bliss 3 column B.G. 3" stroke.
Toledo #34 Back Flywheel, arranged M.D. (2).
Ferracute #P3, plain flywheel.
Toledo #1 O.B.I.
Bliss-"Stiles", No. 1, No. 2, and No. 3. Plain flywheel.
Waterbury-Farrel 105-ton O.B.I., M.D., hi-spd, power Press, double roll feed. 1" stroke, Bed 37" R to L, 20" F to B.
Bliss #16 Horn Press.
Standard Automatic Drop Hammer, 300 lbs. Like new.

Waterbury-Farrel Cold Header, double stroke, open die, ½" cap.
Manville Cold Header, single stroke, solid die, 3/16" cap.

BORING MILLS

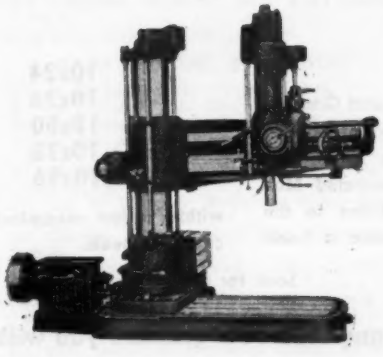
100" Niles-Bement-Pond Bor. & Turn. Mill.
48" Gisholt, vert. Boring & Turning Mill.
Horiz. #36 Landis-Rochester, 3½ Bar Floor Type—Floor Plate 72" x 120".
42" Bullard Vertical Boring Mill with side head; New Era Type.
54" Colburn Vertical Boring Mill.
#31 Lucas Horizontal Boring Mill, 3" bar.

GRINDERS

16" Heald Rotary Surface Grinder.
16" Persons-Arter Rotary Surface Grinder.
#4 Brown & Sharpe Universal Grinder.
#2 Cincinnati Centerless Grinder, Filmatic.
#12 Greenfield Internal Hydromatic Grinder, sizematic type, complete with Tank and Pump. 15" swing, 5" hole, 4" dee.
Oliver Model 51 Drill Grinder; 1½" cap.
14"x36" Cincinnati Cyl., motor driven.
6"x32" Norton Cyl., overhead c/s drive.
12"x12"x36"—#2 Diamond Surface Grinder.

PLANERS

120"x72"x35' Betts, 4 Heads, M.D.
48"x48"x12' Putnam Heavy, 2 Heads, M.D.
30"x30"x12' American M.D., 2 Heads.
30"x30"x10' Cinn. Heavy Pattern, 2 Hds.
20"x20"x24" N.-B.-P., Planer Shaper, M.D.



Cincinnati-Bickford 5' Arm, 13" round column with air clamp. Oil grooved, tee slotted base, side base, with plain box table with #5 Morse Taper spindle. Motor drive.

DRILLING MACHINES

Bickford 4-spindle Rail Drill, #4 Morse Taper. Table 20" x 67".
Avey, 2 & 3 spindle Prentice, 4 spindle.
Henry & Wright, 6 spindle.
Woodward & Rogers, 6 spindle.
Fosdick 13", 4 spindle (2). 2 spindle (1).

RADIAL DRILLS

3' Dreses, 10" rd. col. QCG., M.D.
2½' Arm 9" Col. Cincinnati Bickford.
4' Arm 11" Col. Cincinnati Bickford.
5' Arm 11" Rd. Col. Cincinnati Bickford.
5' Arm 13" Rd. Col. Cinn. Bick. air clamp.
6' Arm 14" Col. Cincinnati Bickford.
3' 9" col. American, S.P.D.

MULTIPLE DRILLS

Fox #15H 54 spindle hydraulic feed.
Natco #D-5, 10 spindles #1 M.T.

MILLING MACHINES

No. OY Brown & Sharpe plain (2).
#3, #4 & #5 Cinn., High Power, Plain, S.P.D.
No. 0 Bickett Vertical Bench Miller.
#2-#1½ Brown & Sharpe Plain Millers.
No. 1½ Valley City Universal, Cone Dr.
No. 1 Brown & Sharpe, Plain (6).
P & W 2½" Duplex Spline Miller.
Hall Planetary Thread Miller 24".
No. 8 Lees Bradner Thread Miller.

LATHES

Putnam, 26 x 12 Heavy Q.C.G., arr. for M.D.
American, 16 x 6 Q.C.G., Geared Head.
Hendey, 16 x 10 Q.C.G., Turner M.D.
Potter & Johnston #6A Automatic Chuckers; 3½" dia. hole in spindle (2).
Seneca Falls Tool Room, 14 x 6, Q.C.G.
20 x 10 Lodge & Shipley, G.H., M.D., Taper.
16"x6' Hendey Toolroom Lathe with relieving attachment, taper attachment, draw bar and collets. Geared Head.
16" Warner & Swasey Fox Brass (2).
16" Dreses Fox Brass.
Lodge & Shipley 16" x 8' 12-Speed Selective Geared Head.
Hendey 14"x6' Toolroom Lathe with taper, collets, M.D.

1—1¼" Cone 4-spindle Automatic Screw Machine, M.D., complete.

SHAPERS AND GEAR CUTTERS

26" Cincinnati Triple Geared, Belt Dr.
#61-2 Fellows 36" Gear Shapers (2).
12" Schuchart & Schutte Gear Hobber.
#1 Adams Gear Hobbers, Belt driven (3).
14" Rockford crank shaper.
No. 2 Baker Keyseater.

MISCELLANEOUS

J. C. Miller Co. Lacq. Heater with acquistat.
Heat Treating Furnaces for the tool room.
Sleeper & Hartley #1 Wire coiling machine for making BX cable.
50 K.W. Moesta Gun Welder Transformer, portable, 25 cy. 440 volts.
Blake and Knowles 12x2x12 Simplex Type, Hydraulic Steam Pump, 2000 lbs. pressure with 80 to 125 lbs. steam, delivers 9 gallons per minute.
#228C Greenlee Vertical Hollow Chisel Mortizer, Power feed, M.D.
No. 7B High Speed Riveting Hammer, cap. ¾" to 1½". New this year.

HEADQUARTERS FOR POWER PRESSES

**The above list, selected from our current stock, is subject to prior sale or subsequent additions. Hence we urge your prompt inquiries on any of these machine tools or others in which you are interested.*

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Modernized
CYLINDRICAL GRINDERS *for* SUPER-GRINDING *and* MICRO-FINISH

SIZES AVAILABLE

10x24	14x36	16x50
10x36	14x50	16x72
10x50	14x72	18x96
10x72	14x96	18x120
10x96	16x30	

Hill-Clarke Modernized and Motorized Cylindrical Grinders offer refinements in design which minimize vibration and assure extreme accuracy on all grinding operations. One of these refinements, the Hill-Clarke patented Multiple V-belt Drive to work spindle, contributes to the smoothness in operation which makes possible a finish within a few micro-inches even when using standard grain free-cutting wheels.

Send for a copy of our catalog "Super Grinding."

HILL-CLARKE MACHINERY CO. CHICAGO U.S.A.

Have you any NORTON grinders you wish modernized and motorized?

HILL-CLARKE MACHINERY CO.

651 WASHINGTON BOULEVARD **CHICAGO 6, ILL.**

#4MS Cincinnati DIAL TYPE Vertical Milling Machine, rapid traverse in head

#33 EX-CELL-O Thread Grinder

12" x 42" Jones & Lamson Universal Thread Grinder

#61-A Fellows Gear Shaper

#2-L Gisholt Universal Turret Lathe Bar & Chucking equipment

All latest type machines.

Many more. Send us your inquiries.

HAZARD BROWNELL
Machine Tools
350 Waterman St., Providence 6, R.I.
Dexter 8880

PLANER

72" x 56" x 16' Gray 4 heads. M.D.

AARON MACHINERY CO.
45 CROSBY STREET NEW YORK, N.Y.

LUCAS of BRIDGEPORT

offers the following:

NO. 0 INDEXO SCREW MACHINE
Motor driven, with slotting attachment

TWO—9/16 ACME AUTOMATICS
Model "C" 5-spindle, Rebuilt and guaranteed

CAMPBELL CUT-OFF MACHINE
Model 213 wet abrasive cut-off, New in 1943

2A WARNER & SWASEY
Universal geared head Turret Lathe

NO. 13 BROWN & SHARPE
Gear Cutter, motor-drive

NO. 2 PRATT & WHITNEY
Jig Borer, motor-drive

MACHINE TOOLS
NEW—USED—REBUILT

J. L. LUCAS & SON, INC.
BRIDGEPORT 5 CONNECTICUT

Boring Mills, 36"-42"-52"-72"-96".
Miller Vertical, #3 B. & S., S.P.D.
Miller & Shaper, #14 Cochrane-Bly, Vert., M.D.
Press, Forging 1000 Ton United, SL-Hyd.
Planer, 36"x36"x12' Powell 4 Hds.
Profiler, #13 P. & W., B.D.
Shaper, 20"-24"-32".
Shaper, 36" Morton, Draw Cut.
Straightener, Sheet 42" W-F M.D.

West Penn Machinery Company
1210 House Bldg. Pittsburgh, Pa.

OTT MACHINERY SPECIALS

AUTOMATICS, Acme 9/16" Mod. C 5 spd., M.D.
AUTOMATICS, Acme 2 & 3" Mod. B 4 spindle, M.D.
AUTOMATICS, Gridley, 9/16", ⅞ & 1¼" Mod. G.
AUTOMATICS, Cone, 1¼ & 1½" 4 spindle
AUTOMATICS, Gridley, ¾, 1¼, 1¾, 2¼" & 2½" Model F, M.D.
AUTOMATICS, Gridley, 2¼, 3¼, & 5¼" S. S.
AUTOMATICS, Cleveland 1¼, 1½, 2, 3½ & 5½" Model A, M.D.
AUTOMATICS, Cleveland, ⅞, 1¼, & 2" Mod. B
AUTOMATICS, Cleveland ⅞, 1⅜ & 1⅝" Mod. M
AUTOMATICS, New Britain #22 and 24 Chuckers
AUTOMATICS, Potter & Johnston #5a & 6a
BORING MILLS, 30" Bullard, M.D.
BORING MILLS, Rockford, 3½" bar, Horizontal, 24x72" table, M.D.
DRILLS, High Speed, B. B. 1 to 6 spindles
GEAR HOBBERS, 12 Barber-Colman, M.D.
GEAR SHAPERS, #7 High Speed, M.D. & #6
GRINDER, Brown & Sharpe #5 & 12 Plain, M.D.
GRINDERS, Heald #72 Hyd. 2 M.D.
GRINDERS, Bryant #3, 6 & 18 Internal, M.D.
GRINDERS, Rivett #103 Internal, M.D.
GRINDERS, Diamond Surface #2, M.D.
GRINDERS, Landis Hydraulic, 6x18" M.D.
GRINDERS, Pratt & Whitney, 14" Vertical Surface, M.D., 9x31" Magnetic Chuck
LATHES, American 14x6' & 20"x8', M.D.
LATHES, Hendey 24"x10' T.A. M.D.
LATHES, Lodge & S, 20"x10' Q.C. M.D.
MILLING MACHINES, #2 B Hog B&S Plain M.D.
MILLING MACHINES, #2B Rockford Universal
MILLING MACHINES, Becker Vertical #5 & 6
PLANER, Ohio 42"x42"x12' One Head, M.D.

OTT MACHINERY SALES, INC.
542 Second Avenue
Detroit 26, Mich.

MONA MEMBER

Eastern Rebuilt Machine Tools for Immediate Shipment

ENGINE LATHES

20"x8' American Geared Head, m.d., taper
13"x6' Willard Geared Head, m.d.
14"x6' Pratt & Whitney, cone
14"x8' Sidney, cone, motorized
16"x6' Lodge & Shipley, cone
20"x10' American Geared Head, m.d.
22"x18' centers (22' bed) American 100 H.P. Input Super Lathe, m.d., p.r.t., 4 motors
24"x8' American Geared Head, m.d., taper
24"x30' Schumacher-Boye, cone
28"x12' Schumacher-Boye, cone
30"x13'6" Niles-Bement-Pond, m.d.
30"x18' American Geared Head, m.d.
30"x26' Lodge & Shipley Selective Head, m.d.
30"x28' bed (20' centers) Niles Time Saver Lathe, m.d., p.r.t., latest type
30"x28' Niles as above, with taper attachment
36"x10' Putnam m.d.
36"x12' Wright, cone
36"x14' Boye & Emmes, cone
36"x26' Bridgeford Geared Head, m.d.
36"x28'6" (20' centers) Niles H.D., 24 speed head, m.d., p.r.t., latest type machine
36"x36'6" (28' centers) Niles H.D., 24 speed head, m.d., p.r.t., 2 carriages, latest type
42"x26' American Geared Head, m.d., p.r.t.
24"x12' American Geared Head, m.d., taper

MANUFACTURING LATHES

3½x36" LoSwing, s.p.d.
3x80" LoSwing, s.p.d.
8x84" LoSwing, m.d.
9x12" Sundstrand Mfg.
11"x4' Wells Speed Lathe
11"x28" centers Reed Speed Lathe
13x24" Coulter Automatic Threading, m.d.
13"x96" Automatic Threading, m.d.
15"x6' Automatic Threading
17x124" centers LeBlond Rapid Production Geared Head, m.d., latest type
20"x9' LeBlond Mfg., m.d.
20"x16' American Geared Head, arr. for spindle boring
Niles-Bement-Pond Quartering Machine, m.d., new
No. 5 — 42x96" Niles - Bement - Pond Center Driving Car Wheel Lathe, m.d., new

BROACHING MACHINES

Colonial Single Ram Hydraulic, model VAS-5-42, m.d., latest type
No. 75 H.P. LaPointe Horizontal Hydraulic, m.d., stroke 150", normal pull 37½ tons, latest type
No. 2 LaPointe, belt
No. 2 LaPointe of Hudson, belt
No. 3 J. N. LaPointe Double, belt
No. 4 LaPointe of Hudson, gear box
Cincinnati Mill Broach, m.d., 10" spindle, new

BALL BEARING DRILLS

14" Canedy-Otto, m.d.
Automatic Sensitive, belt
Allen Bench Type, m.d.
No. ½ Avey, m.d.
No. 1 Avey Bench Type, m.d.
No. 5M-16" Fosdick, m.d.
Mason Bench Type, belt
Providence Eng. Co. Model E, gear box
Henry & Wright Class K, belt
2 spindle Sigourney, belt
3 spindle Barr, belt
4 spindle No. 3 Avey, m.d., 2 spindles have power feed
4 spindle Gardam, belt
4 spindle Kokomo, belt
6 spindle No. 3 Avey, m.d.

MULTIPLE SPINDLE DRILLS

No. 2 Baush, m.d., hydraulic, 16x30" head, 12 spindles
No. 2 Baush, m.d., mechanical, 16x30" head, 8 spindles
No. 3 Baush, m.d., mechanical, 16x30" head, 12 spindles
No. 3 Baush, m.d., mechanical 20x40" head, 15 spindles
No. 11 Pratt & Whitney belt, 10 spindles
No. 26C Fox Multiple Tapper s.p.d., 50 spindles, No. 1 Taper
3 spindle 12" Rockford Gang Drill, m.d.
4 spindle Harrington H.D. Rail, No. 4 taper
No. 16 Fixed Center-Foote-Burt, m.d.
No. 3 Barnes Hydram, with fixed center head
4 spindle Foote-Burt, No. 4 taper

GEAR CUTTERS & HOBBERS

No. 13 LS Fellows Gear Lapper, m.d.
No. 61 Fellows Gear Shaper, belt
No. 64-S Fellows Gear Shaper, m.d.
3" Gleason Straight Bevel Gear Generator, m.d.
8" Gleason Mfg. Type Straight Bevel Gear Generator, m.d.
9" Pratt & Whitney Hydraulic Spur Gear Grinder, m.d.
11" Gleason Straight Bevel Gear Generator, m.d.
12" Gleason Straight Bevel Gear Generator, m.d.
No. 3-26", 3-36", 3-36", 4-36", 6-60" Brown & Sharpe Auto. Spur Gear Cutters
No. 3-26" Cincinnati Auto. Spur Gear Cutter
No. 36-S Gould & Eberhardt Gear Cutter, m.d.
No. 36-B Gould & Eberhardt Spur & Bevel Gear Cutter, m.d.
48" Cleveland Gear Hobber, m.d.
Cincinnati Gear Burnisher, m.d.
Gleason Spiral Bevel Gear Rougher, s.p.d.
No. 2HS Lees-Bradner Spur & Helical Gear Grinder, m.d.
24" Cross Gear Tooth Rounder, m.d.

PLAIN CYLINDRICAL GRINDERS

6x18" Landis, m.d.
6x32" Norton, m.d.
8x36" Cincinnati Saddle Type, m.d.
10x24" Landis, m.d.
10x36" Cincinnati Plain Hydraulic, model EA, m.d.
10x36" Landis Plain, m.d.
10x48" Brown & Sharpe, belt
10x48" Landis Type C Hydraulic, m.d., latest type
10x52" Landis, m.d.
10x72" Landis, m.d.
12x36" Cincinnati, belt
12x36" Modern, m.d.
12x36" Modern, belt
12x42" Landis, belt
12x48" Cincinnati Plain Self-Contained, 3 motor drive
12x48" Modern, motorized
12x72" No. 16 Brown & Sharpe, belt
12x96" Landis, m.d.
14"x16" Cincinnati Plain Self-Contained, 3 m.d.
14x48" Cincinnati Plain Self-Contained, 3 m.d.
16x72" Landis, m.d.
16x216" Landis Type B Plain Hydraulic, 3 m.d., latest type
26x96" Landis, m.d.
20x120" Landis, m.d.

UNIVERSAL CYLINDRICAL GRINDERS

No. 2—12x30" Brown & Sharpe, belt
16x68" Landis, belt

DISC GRINDERS

No. 4 Gardner, m.d.
No. 20 Gardner Comb. B.B. Disc Grinder and Roll Sander, m.d.

INTERNAL GRINDERS

No. 16—22" Bryant Hydraulic Hole, m.d., latest type
No. 24—20" Bryant Hydraulic Hole, m.d., very late
No. 8, 10, 20 Bryant, belt
No. 72A3 Heald Sizematic, 2 m.d.

SURFACE GRINDERS

No. 16—30" Blanchard, m.d. on spindle
14" Pratt & Whitney Vertical Surface, m.d.
Builders Iron Fdry. Co., m.d.
54" Bridgeport Knife, belt
No. 76D Baldwin-Tuthill Knife, m.d., cap. 76" knives
No. 1 Fraser Lapper, 26" plate
38"x38"x12' Gray Planer Type Surface, m.d.

KEYSEATERS

No. 2 Mitts & Merrill, belt
No. 2 Morton, belt
30" stroke Morton, m.d.

PRESSES

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S51 Ferracute D.C.
No. 0 Springfield Straightening
B33, B45 Metalwood Hydro-Pneumatic

PLAIN MILLING MACHINES

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No. 3B Brown & Sharpe, m.d.
No. 3B Milwaukee Plain, double overarm, m.d.
No. 4 Cincinnati Plain, m.d.

VERTICAL MILLING MACHINES

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No. 3 Cincinnati, m.d.
No. 3B Milwaukee, m.d. in base
No. 3B Milwaukee, s.p.d.
No. 3V Toledo, s.p.d.
No. 5 Brown & Sharpe, cone
No. 5 Jackson, m.d.
No. 6 Becker, cone
2 spindle Newton, m.d.

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No. 34-36 Cincinnati Plain Hydromatic, m.d., latest
No. 34-36 Cincinnati Duplex Hydromatic, m.d. in base, with tracer control, latest type
No. 4-36 Cincinnati Plain Hydromatic, m.d., latest type
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Hall Planetary Thread, m.d., for internal threading
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28" Cincinnati Plain Automatic, s.p.d.
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6x14" Pratt & Whitney Thread, belt
6x20" Pratt & Whitney Type B Geared Head Thread, m.d. in base
6x48" Pratt & Whitney Thread, m.d.
6x80" Pratt & Whitney Thread, m.d.
Becker Lincoln Type, belt
No. 2, 12 Pratt & Whitney Lincoln Type, belt
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36"x36"x14' Bement Slab, m.d.
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1⅜" Gridley Model G 4 spindle
1⅝" New Britain 6 spindle
4½" Gridley 4-spindle, Model H
No. 454 New Britain, 4-spindle chucking
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15" Sundstrand automatic lathe
Gisholt Simplimatic

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22" Barnes 2-spindle, all grd, self oiling
24", No. H3 Barnes Hydram
3½' American radial
4' Western radial, Timken bearing, M.D.

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No. 12 Bar. Col. long bed splining
Nos. 7 and Z1 Fellows shapers
No. 16HS Gould & Eberhardt hobbers
No. 1 Lees Bradner hobbers
64"x20" G & E spur gear cutter
26"x6" G & E spur gear cutter
11" Gleason straight bevel, segments & Gears
15" Gleason spiral bevel pinion and gear roughers
18" Gleason bevel testers and lappers
8" Red Ring spur gear lapper
Cimatool "Peerless" gear chamferers
Lipe 2-spindle gear chamferer

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No. 1 G Gronby internal
No. 75 Heald internal
Heald No. 72 automatic electric sizing internal
12"x30", 16"x36" & 16"x52" Landis
6"x20", No. 10 & 6"x32", No. 11 B.&S.
10"x24", No. 1 Brown & Sharpe univ.
10"x36" & 10"x50" Norton
20" Gardner semi-automatic disc grinder
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16"x48" Landis crankpin grinder
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No. 1½ Cincinnati tool & cutter

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No. 1 Evans Ajax taper forging roll
3" Acme upsetter (forging machine)

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12"x8' Sebastian
14"x6' Mulliner
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28", No. 3B Foster turret
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8" and 12" Sundstrand Stub
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2½" Universal horizontal mill
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No. 11 Natco 16 spindle
No. 3 Defiance, s.p.d., #5 Morse Taper
No. 24 Foote-Burt, s.p.d., #4 Morse Taper
21" Canedy-Otto Single Spindle, m.d.
6 Spindle Avey matic, m.d.
28" Rockford sliding head, single spindle
24" Barnes Camelback
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Stecher Deep Hole, m.d., 2¼" capacity

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No. 3—26" Brown & Sharpe
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No. 6 Cincinnati
No. 6 Fellows Gear Shaper, m.d.
No. 13 Brown & Sharpe
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96" Gleason Spur & Bevel Gear Planer
30" Rochester Gear Tooth Rounder

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12" Heald Rotary Surface, s.p.d.
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No. 72A3 Heald Gagematic
No. 60 Heald Internal
10 x 36 Norton Cylindrical
10 x 30 Landis Cylindrical
No. 22 Heald Rotary Surface
76" Rogers Knife Grinder

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12" x 6' Hendey, q.h.
12" x 10' American, c.d.
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16" x 8' Pratt & Whitney, c.d.
18" x 8' American, c.d.
18" x 10' Lodge & Shipley, c.d.
8" x 60" Fitchburg Lo-Swing, q.h.

LATHES, TURRET

42" Bullard New Era V.T.L.
No. 2A Warner & Swasey, q.h.
No. 6 Warner & Swasey, q.h.
2¼" x 24" Jones & Lamson, q.h.
No. 3A Warner & Swasey, q.h.
28" Libby, q.h.
No. 5A Potter & Johnston, q.h.
No. 2 Warner & Swasey

MILLS

No. 2B Milwaukee Universal, m.d.
No. 4 Cincinnati Plain, s.p.d.
No. 3 Cincinnati Plain, s.p.d.
No. 1½B Milwaukee, s.p.d.
No. 1½A Rockford Plain, c.d.
No. 2½B Milwaukee Vertical, s.p.d.
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No. 0-8 Cincinnati Vertical
No 7 Becker-Lincoln Type
4" Pratt & Whitney Spline
No. 5 Becker Vertical, c.d.

MISCELLANEOUS

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12" Williams Pipe Machine
4" Stevens Vertical Slotter
16" Betts Vertical Slotter
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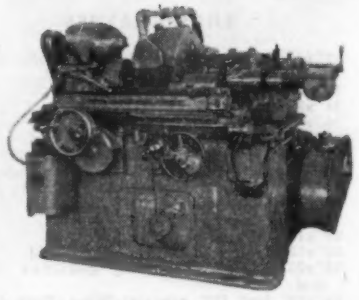

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60" Niles, 2-swivel heads, Link belt, four speed Transmission, for motor drive.

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1500 Ton, 29 Bliss; stroke 4", 40" bet. Hsgs.

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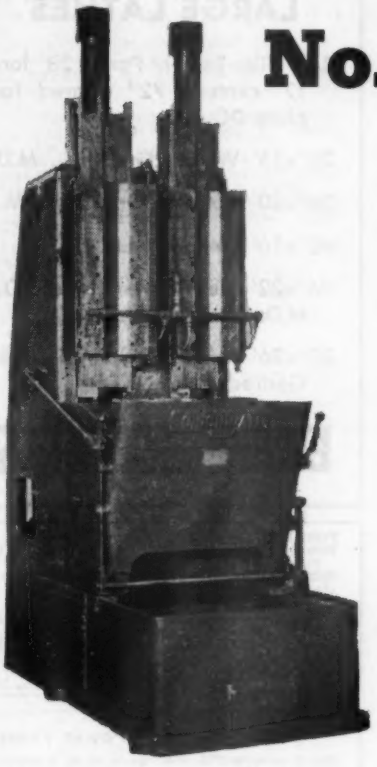

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Maximum stroke in inches 54"

Hydraulic ram movement

Maximum broach length 50"

Broaching force for which tools should be designed 10,000 lbs.

Ram speed, 31' per minute

Equipped with horizontal work table of indexing type

Equipped with coolant pump, ½ H.P., 3 phase, 60 cycle, 220/440 Volt Master Electric motor

Hydraulic pump driven by 20 H.P. U.S. Motor, 3 phase, 60 cycle, 220/440 Volt, 1000 R.P.M. and starter

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6' American Triple Purpose Plain Radial Drill, M.D.
#3 Cincinnati Vertical Milling Machine H.P.

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6' Cincinnati Bickford Plain Radial Drill.
7' Cincinnati Bickford Plain Radial Drill.
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7' American Triple Purpose, Motor on arm.

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12" x 96" Landis Plain, S.C.
18" x 85" Landis Plain Self contained.

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18" Gleason Bevel Gear Generators.
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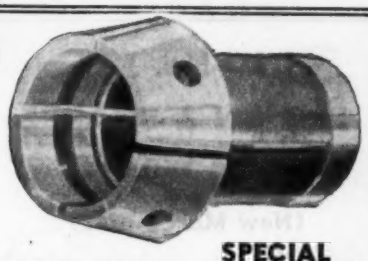

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FOSDICK 3½' Radial Drill, G.B., M.D.
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SPECIFICATIONS:

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Feed: Longitudinal—18"

Adj. of Spindle-Transverse—3¼"

Vert. adj. of Spindle—10½"

Spindle Taper—No. 50

Spindle Speeds: 25 to 1050 RPM

Climb Milling both directions

Electrically controlled

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1—6' Niles Plain Radial Drill, rebuilt, gear box, A.C. m.d.

1—3" bar Morris Horiz. Boring Mill, with 5 boring bars, m.d.

1—12"x18" Cinci. Rebuilt Plunge Cut Grinder 18" dia. x 9" face wheel, A.C. m.d.

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3—#7 Fellows Gear Shapers, M.D.
#17 Barber Colman Heavy Duty Gear Hobber, can take a hob up to 5¾" dia., M.D.
10x30 Norton O.D. Grinder, self contained, 10 yrs. old
8" Bullard Mult-Au-Matic, 12 spindle
#40 Cross Gear Tooth Rounder, M.D.
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12" x 42" Jones & Lamson, New 1940
#33 Excello, New 1940, also #1F Foster Fastermatic, Turret Type

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Two 100" BETTS VERTICAL BORING MILLS, table 96" diameter 8½" thick. Direct Geared Motor Drive with Motors, Geared Automatic Power Feeds, Two Swivel Heads. Can show running. Must be moved promptly. Price, $3000.00 each for quick sale.

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AUTOMATIC: Conomatic 4 Sp. x 1¼" Cap. (1936) Also 1½"
AUTOMATICS: (2) Gridley Single Sp. 3¼", 4¼" Cap.
BORING MILL: Horizontal, Gisholt-4"
CUT-OFF: Delta, Abrasive, 1944
DRILL PRESSES: (2) 3 Spindles No. 1 Morse-Prentice, Reed; Foote-Burt No. 25—24" No. 5 Morse
DRILL PRESS: Barnes #263 Slid. Hd. #5 Morse
DRILL PRESSES: (2) Canedy-Otto 21" motorized, 1944
DRILL: Radial, Walker-Turner, 1944
GRINDER: Bryant No. 16-16" Chucking (1943)
GRINDER: Centerless Zephyr No. 2 (NEW)
GRINDER: Pratt & Whitney Vertical 8" Chuck
GRINDER: Red Head "Heald," New, 12,500 R.P.M.
GRINDER: Queens City, Double End Tool and Drill (1944)
GRINDER: Internal-Sav-Way 9"x18" (1944)
IRON WORKER: #20 Pels and Angle Shear 6"x6"x½"
LATHE: Adams Short Cut Geared Head 14"x4'
LATHE: LeBlond 19"x6' HD, QC
LATHE: Willard 14"x36" centers QC
LATHE: Seneca Falls 12"x5'; Monarch 14"x8' QC
MILLER: Vertical No. 2 K.M. Milwaukee (1941)
MILLER: Plain Horiz. No. 3 LeBlond, Vert. Att.
MILLER: Plain Horiz. (No. 1) No. 26 Becker Brainard
MILLER: Milwaukee No. 2 Universal QC
MILLER: Pl. Horiz. Cinc. #2M, Rect. Arm
MILLER: Universal—Cinc. #3 Rect. Arm
PIPE: Cut-off 3" Hurlbert-Rogers
POWER PRESS: All sizes
PLANER: (2) Woodward Powell 30"x30"x10', 1 hd, 2 hds.
PUNCH & SHEAR: Kane & Roach No. 3
COMB. PUNCH & SHEAR: Pels #20
PRESSES: Air Hydraulic (New)
RIVETER: Counter Sinker Farnham, hyd. (1944) 36" Reach
RIVETER: Hanna Pneumatic 30 ton 15"
RADIAL DRILL: Carlton 3', Cheap
SAWS: Band, Kalamazoo, Metal (NEW) 8"x16"
SHEAR: Beam Pelz T-36 H.D.
SQ. SHEAR: Power, Pels 24" gap 100"x¾"
SLOTTER: Vert. Bement Niles—12"
THREAD MILLER: Plan-O-Mill 8" Int. Ext. x 31" long (1943)
TURRET: B. & O. 3½" collets Univ.
TURRET: Pratt & Whitney, No. 1 Hand Screw
TURRET: No. 4 W. & S. Geared Head, Late
TURRETS: (5) Simmons Micro-Speed 1¼" Cap. (1943)
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MILLER: 2H Milwaukee, Vertical, H.S., Late

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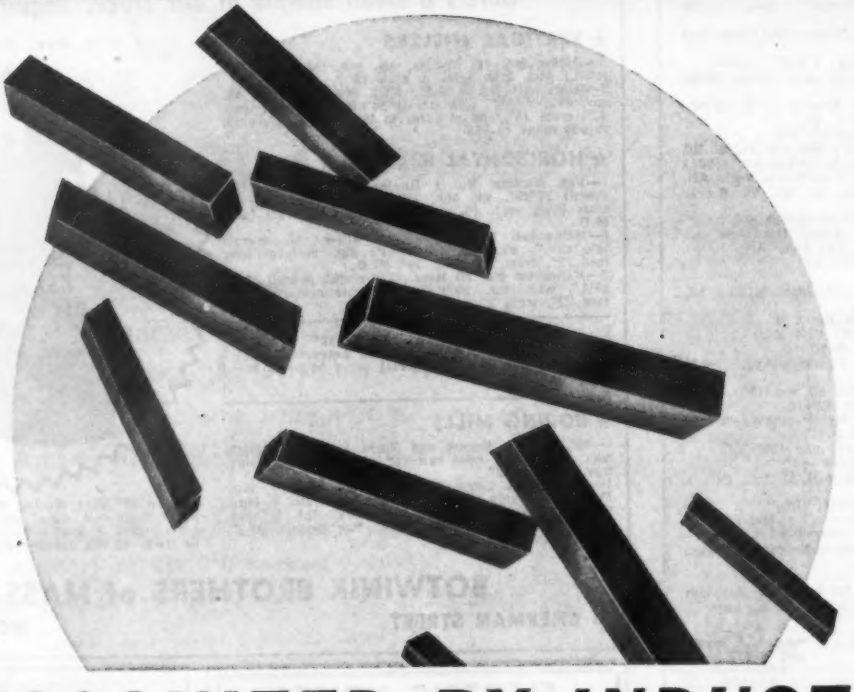

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ADVERTISERS INDEX

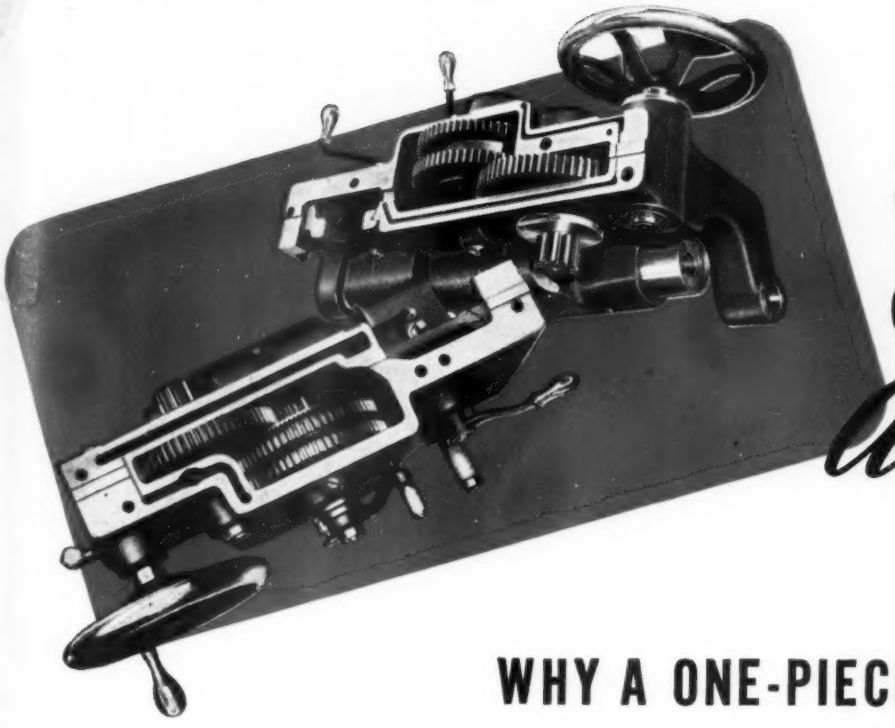
	Page
Abbott Ball Co.	202
Abrasive Co.	297
Abrasive Machine Tool Co.	250
Accurate Bushing Co.	302
Acme Aluminum Alloys, Inc.	182
Acromark Co.	266
Adams Co.	216, 218
Air Reduction	291
Allegheny Ludlum Steel Corp.	307
Allen-Bradley Co.	189, 190
Allen Manufacturing Co.	196
Allis-Chalmers Mfg. Co.	17, 32
Almond Mfg. Co., T. R.	306
Aluminum Co. of America	51, 63
American Chain & Cable Co., Inc.	178, 344
American Gauge Co.	306
American Laundry Machinery Co.	334
American Metal Hose Branch—Anaconda Copper Mining Co.	275
American Optical Co.	231
American Screw Co.	186
American Swiss File & Tool Co.	280
American Tool Works Co.	16
Ampco Metal, Inc.	176
Angier Corp.	325
Armstrong-Blum Manufacturing Co.	34
Armstrong Brothers Tool Co.	54
Arter Grinding Machine Co.	262
Atkins & Co., E. C.	273
Atlas Press Co.	243
Automatic Machine & Tool Co.	294
Avery Drilling Machine Co.	266
Axelson Manufacturing Co.	237
Bakelite Corp.	173
Bantam Bearings Div. Torrington Co.	185
Barber-Colman Co.	79
Bardons & Oliver, Inc.	73
Barnes Co., W. F. & John	235
Baumbach Manufacturing Co., E. A.	224
Baush Machine Tool Co.	82
Bay State Abrasive Products Co.	301
Bearings Co. of America	171
Beaver Gear Works, Inc.	218
Behr-Manning Corp.	329
Bellows Co.	314
Black & Decker Manufacturing Co.	164, 165
Black Drill Co.	289
Blake Co., Edward	294
Blanchard Machine Co.	55
Blank & Buxton Machinery Co.	212
Bodine Corp.	257
Bokum Tool Co.	332
Boston Gear Works, Inc.	223
Boyar-Schultz Corp.	250
Bradford Machine Tool Co.	250
Braun Gear Co.	224
Breuer Electric Manufacturing Co.	346
Bridgeport Machines, Inc.	234
Brown & Sharpe Mfg. Co.	56, 57
Bryant Chucking Grinder Co.	86
Bryant Machinery & Engineering Co.	240
Buffalo Bolt Co.	191
Buhr Machine Tool Co.	259
Bullard Co.	53
Bunting Brass & Bronze Co.	193
Capewell Manufacturing Co.	161
Card Manufacturing Co., S. W.	312
Carlton Machine Tool Co.	269
Challenge Machinery Co.	348
Chicago Screw Co.	180
Chicago Tool & Engineering Co.	340
Chicago Wheel & Mfg. Co.	160
Cincinnati Bickford Tool Co.	95
Cincinnati Electrical Tool Co.	344
Cincinnati Gear Co.	222
Cincinnati Gilbert Machine Tool Co.	260
Cincinnati Grinders Incorporated	10, 11
Cincinnati Lathe & Tool Co.	260
Cincinnati Milling Machine Co.	4, 5
Cincinnati Planer Co.	58
Cincinnati Shaper Co.	98
Cleerman Machine Tool Co.	240
Clemson Brothers, Inc.	326
Cleveland Hobbing Machine Co.	37
Cleveland Pneumatic Tool Co.	184
Cleveland Twist Drill Co. Momax Div.	283
Climax Molybdenum Co.	149
Cone Automatic Machine Co.	35
Consolidated Machine Tool Corp.	41
Continental Machines, Inc.	251
Continental Tool Works, Div. of Excello Corp.	27
Cortland Grinding Wheel Co.	337
Coulter Machine Co., James	258
Covel Mfg. Co.	265
Crafts Co. Inc., Arthur A.	302
Criterion Machine Works	316
Cross Company	84, 85
Cunningham Co., M. E.	346
Curtis Pneumatic Machinery Co.	342
Curtis Universal Joint Co., Inc.	204
Cushman Chuck Co.	333
Danly Machine Specialties, Inc.	230
Darwin & Milner, Inc.	288
Davis Keyseater Co.	266
Davis & Thompson Co.	260, 306
Dayton Rogers Mfg. Co.	338
Dayton Rubber Mfg. Co.	200
Deepfreeze Div., Motor Products Corp.	323
Defiance Machine Works, Inc.	253
DeLaval Separator Co.	168
DeSanno & Son Inc., A. P.	274
Desmond-Stephan Mfg. Co.	306
Detroit Bevel Gear Co.	218
Detroit Tap & Tool Co.	151
DeVlieg Machine Co.	36
Disston & Sons, Inc., Henry	279
Douglas Machinery Co., Inc.	345
Dow Chemical Co.	179
Drafto Corporation	286
Dykem Co.	302
Earle Gear & Machine Co.	222
Eastern Machine Screw Corp.	332
Elastic Stop Nut Corp.	208
Electric Auto-Lite Co.	199
Empire Tool Co.	335
Errington Mechanical Laboratory	310
Etna Machine Co.	230
Ettco Tool Co.	331
Excello Corp.	28, 29
Fafnir Bearing Co.	209
Falk Corporation	220
Famco Machine Co.	344
Farrel-Birmingham Co., Inc.	214
Fawick Airflex Co., Inc.	303
Federal Bearings Co., Inc.	31
Federal Products Corp.	293
Fellows Gear Shaper Co.	8, 9
Firth-Sterling Steel Co.	71
Fitchburg Grinding Machine Corp.	21
Fitzsimmons Co.	212
Foote-Burt Co.	42
Ford Chain Block Div. American Chain & Cable Co., Inc.	344
Ford Motor Co., Johansson Div.	288
Fosdick Machine Tool Co.	30
Fuller Brush Co., Industrial Div.	345
Gairing Tool Co.	65
Gallmeyer & Livingston Co.	255
Ganschow Gear Co.	224
Gardner Machine Co.	246
Gates Rubber Co.	187
Gear Grinding Machine Co.	254
Gear Specialties Mfrs.	222
General Aircraft Equipment, Inc.	284
General Die-Stamping Tool Co.	310
General Electric Co.	87
General Engineering & Mfg. Co.	239
Geometric Tool Co.	311
Gilmore & Co., F. F.	312
Gisholt Machine Co.	46, 50
Gleason Works	3
Gorham Tool Co.	360
Goss & deLeeuw Machine Co.	260
Graham Mfg. Co.	332
Grant Gear Works	216
Grant Mfg. & Machine Co.	232
Gray Co., G. A.	92
Gray-Mills Co.	188
Greenfield Tap & Die Corp.	292
Grinding Supply Co.	347
Grobet File Corp.	308
Gulf Oil Corp.	83
Hamilton Tool Co.	256
Hammond Machinery Builders	256
Hanchett Manufacturing Co.	261
Hanson Whitney Machine Co.	167
Hardinge Brothers, Inc.	39
Hartford Special Machinery Co.	216, 347
Haskins Co., R. G.	159
Haynes Stellite Co.	341
Heald Machine Co.	2nd Cover
Hendey Machine Co.	241
Hill Acme Co.	80
Hobart Brothers	348
Hoefer Mfg. Co.	252
Holman Reamer Co.	318
Honan-Crane Corp.	287
Hones, Inc., Charles A.	347
Hovis Screwlock Co.	225
Howell Electric Motors Co.	183
Independent Pneumatic Tool Co.	52
Ingersoll Milling Machine Co.	40
International Nickel Co., Inc.	210
J & S Tool Co.	288
Johnson Machine Co., Carlyle	196
Johnson Bronze Co.	213
Jones & Lamson Machine Co.	6, 7
Jones & Laughlin Steel Corp.	72
Kaydon Engineering Corp.	192
Kearney & Trecker Corp.	90
Kempsmith Machine Co.	94
Kennametal Inc.	70
Kester Solder Co.	316
King Machine Tool Co.	38
Kingsbury Machine Tool Co.	81
Knight Machinery Co., W. B.	244
Koebel Diamond Tool Co.	326
Kropp Forge Co.	197
Kux Machine Co.	204
L. W. Chuck Co.	267
Laminated Shim Co., Inc.	158
Landis Machine Co.	14, 15
Landis Tool Co.	18, 19
LaPointe Machine Tool Co.	247
LeBlond Machine Tool Co., R. K.	3rd Cover
Lees-Bradner Co.	66, 67
Lehmann Machine Co.	248
Leland Gifford Co.	256

ADVERTISERS INDEX

	Page
LeMaire Tool & Mfg. Co.	215
Lincoln Park Industries, Inc.	153
Linley Brothers Co.	258
Lodge & Shipley Machine Tool Co.	143
Lucas Machine Tool Co.	258
Luers, J. Milton	318
McGraw-Hill Book Co., Inc.,	176, 322, 346, 348
Macklin Co.	304
Mallory & Co. Inc., P. R.	276
Masonite Corp.	229
Master Gauge Co.	310
Matthews & Co., James H.	310
Mattison Machine Works	242
Meisel Press Mfg. Co.	224
Mercury Products Co.	338
Metal Carbides Corp.	232
Metro Tool & Gage Co.	93
Michigan Tool Co.	145
Midvale Co.	343
Mid-West Abrasive Co.	327
Miller-Knuth Mfg. Co.	326
Millholland Machinery Co., W. K.	256
Mitts & Merrill	258
Moline Tool Co.	262
Monarch Machine Tool Co.	24, 25
Monarch Steel Co.	212
Morey Machinery Co., Inc.	268
Morton Salt Co.	318
Muehlhausen Spring Corp.	177
Mullins Mfg. Corp.	205
Murchey Machine & Tool Co.	309
National Acme Co.	47
National Automatic Tool Co., Inc.	245
National Broach & Machine Co.	89
National Machine Tool Co.	318
National Twist Drill & Tool Co.	305
Newark Gear Cutting Machine Co.	250
New Britain-Gridley Machine Division, New Britain Machine Co.	140
New Departure Div. General Motors Corp.	155
Niagara Machine & Tool Works	228
Nichols & Sons, W. H.	166
Nicholson File Co.	277
Nicholson & Co., W. H.	336
Nilson Machine Co., A. H.	230
Noble & Westbrook Mfg. Co.	332
Norgren Co., C. A.	207
Norma-Hoffmann Bearings Corp.	194
Norton Company	22, 23, 45
Numberall Stamp & Tool Co.	180
Oakite Products Inc.	336
Oliver Instrument Co.	236
O'Neil-Irwin Mfg. Co.	230
Orange Roller Bearing Co., Inc.	91
Page Steel & Wire Div., American Chain & Cable Co., Inc.	178
Parker Appliance Co.	315
Peerless Machine Co.	266
Perkins Machine & Gear Co.	219
Philadelphia Gear Works, Inc.	217
Pioneer Pump & Mfg. Co.	198
Pipe Machinery Co.	295
Pittsburgh Steel Co.	169
Pope Machinery Corp.	313
Portage Machinery Co.	232
Porter-McLeod Machine Tool Co., Inc.	268
Potter & Johnston Machine Co.	69
Pratt & Whitney Div., Niles-Bement-Pond Co.	74
Production Machine Co.	266
Producto Machine Co.	224
Progressive Welder Co.	147
Quaker Chemical Products Corp.	64
Railway Express Agency Air Exp. Div.	340
Randall & Stickney	180
Ready Tool Co.	340
Reed-Prentice Corp.	20
Reed Small Tool Works	326
Refiners Lubricating Co.	272
Reynolds Metals Co., Aluminum Div.	174, 175
Rivett Lathe & Grinder Inc.	62
Roberts Rubber Co., Weldon	328
Ruthman Machinery Co.	202
S.K.F. Industries, Inc.	201
Scherr Co., Inc., George	26
Sheffield Corp.	157
Shore Instrument & Mfg. Co. Inc.	347
Sibley Machine & Foundry Co.	336
Sidney Machine Tool Co.	49
Sier-Bath Gear Co. Inc.	221
Siewek Tool Div. Domestic Industries	271
Sisalkraft Co.	338
Smit & Sons, Inc., J. K.	339
Smith & Mills Co.	232
Snyder Tool & Engineering Co.	88
Socony-Vacuum Oil Co., Inc.	324
Somerset Tool Co.	318
South Bend Lathe Works	48
Springfield Machine Tool Co.	60
Square D Co.	195
Stahl Gear & Machine Co.	216
Standard Conveyor Co.	162
Standard Oil Co.	263, 264
Standard Pressed Steel Co.	172, 198
Standard Tool Co.	281, 282
Staples Tool & Engineering Co.	59
Star Electric Motor Co.	211
Starrett Co., L. S.	138
Sterling Grinding Wheel Div.	296
Strand Co., N. A.	342
Strong, Carlisle & Hammond Co.	202
Stuart Oil Co. Ltd., D. A.	334
Sturgis Products Co.	203
Sunnen Products Co.	238
Sun Oil Company	75
Taft-Peirce Mfg. Co.	170
Taylor Machine Co.	224
Texas Co.	96
Thompson Grinder Co.	61
Timken Roller Bearing Co.	4th Cover
Tomkins-Johnson Co.	278
Torrington Co., Bantam Bearings Div.	185
Torrington Co.	224
Trabon Engineering Corp.	206
Tubular Micrometer Co.	342
Tuthill Pump Co.	180
Union Carbide & Carbon Corp.	173, 341
Union Twist Drill Co.	68
U. S. Broach Co.	300
United States Products Co.	294
U. S. Tool Company, Inc.	270
United Welding Co.	322
Universal Boring Machine Co.	258
Universal Engineering Co. (Mich.)	285
V & O Press Co.	232
Vanadium-Alloys Steel Co.	298, 299
Van Keuren Co.	43
Van Norman Co.	12, 13
Vard Inc.	321
Vascaloy Ramet Corp.	332
Victor Machinery Exchange Inc.	308
Vitrified Wheel Co.	290
Vulcan Tool Corp.	78
Waldes Koh-I-Noor, Inc.	319
Walker Co., Inc., O. S.	290
Wall-Colmonoy Corp.	317
Waltham Machine Works	262
Waltham Screw Co.	204
Warner & Swasey Co.	76, 77
Waverly Petroleum Products Co.	272
Weatherhead Co.	181
Wedemann & Godknecht, Inc.	346
Wells Mfg. Corp.	233
Wendt-Sonis Co.	163
Westinghouse Electric & Mfg. Co.	33, 44
Wheelock, Lovejoy & Co., Inc.	198
White & Bagley Co.	302
Wilson, K. R.	226, 227
Wilson Mechanical Instrument Co.	336
Woodworth Co., N. A.	320
Worthington Pump & Machinery Corp.	330
Wyzenbeek & Staff, Inc.	288
Yoder Company	249

Classified Advertising
SEARCHLIGHT SECTION

Classification	Page
BUSINESS OPPORTUNITIES	351
CONTRACT WORK SECTION	349
Bergen Machine & Tool Co. Inc.	349
Bridgewater Screw Products Co.	349
Demers Machine Products Co.	349
Eastern Tool & Mfg. Co.	349
Fasold & Son, Dudley F.	349
General Pattern Works	349
Greist Mfg. Co.	349
J. & S. Tool Co.	349
National Tool & Machine Co.	349
Nilson Machine Co., A. M.	349
Old Colony Engineering Co.	349
Specialty Machine Tool & Die Co.	349
Thomas & Skinner Steel Products Co.	349
EMPLOYMENT SERVICE	350, 351
PATENT ATTORNEY	351
POSITIONS VACANT	350, 351
POSITIONS WANTED	350
REBUILDING SERVICE	352, 354, 356, 359
Hill-Clarke Machy. Co.	354
Indianapolis Machinery & Supply Co., Inc.	356
Simmons Machine Tool Corp.	352
Volyn Machine Tool Works, Inc.	359
SELLING OPPORTUNITIES	351
WANTED TO PURCHASE	351
USED EQUIPMENT	352, 359
Aaron Machinery Co.	352, 354, 358
American Sales Co.	358
American Tool Salvage	359
Atlanta Steel & Supply Co.	351, 356
Bennett Machinery Co.	358
Botwinik Bros. of Mass., Inc.	359
Brooks, B. D.	358
Brownell, Hazard	354
Cincinnati Machinery & Supply Co.	357
DeWitt Tool Co.	357
Dony Machinery Co., D. E.	356
Eastern Machinery Co.	355
Emerman Machinery Corp.	357
Emsco Equipment Co.	359
Falk Machinery Co.	353
Galbreath Machinery Co.	356
Giardino, M. D.	351
Graff Machine Tool Co.	357
Hill-Clarke Machinery Co.	354
Hyman & Son, Joseph	357
Indianapolis Machinery & Supply Co., Inc.	356
Iron & Steel Products, Inc.	358
Kings Co. Machinery Exchange	359
Koontz, H. J.	358
Lucas & Son, Inc.	354, 356, 359
Machinery Dealers National Ass'n	358
Miles Machinery Co., Inc.	356
Morey Machinery Co., Inc.	352
Osborne & Sexton Machinery Co.	352
Ott Machinery Sales, Inc.	354
Paul's Motor & Machy. Supply	358
Reynolds Machinery Co.	358
Simmons Machine Tool Corp.	352
Strong, Carlisle & Hammond Co.	358
United Pipe & Supply Co.	359
Universal Hydraulic Machy. Co.	358
West Penn Machinery Co.	354
Whitney & Son, Inc., Baxter D.	358
Zeeve & Co., Alex.	358



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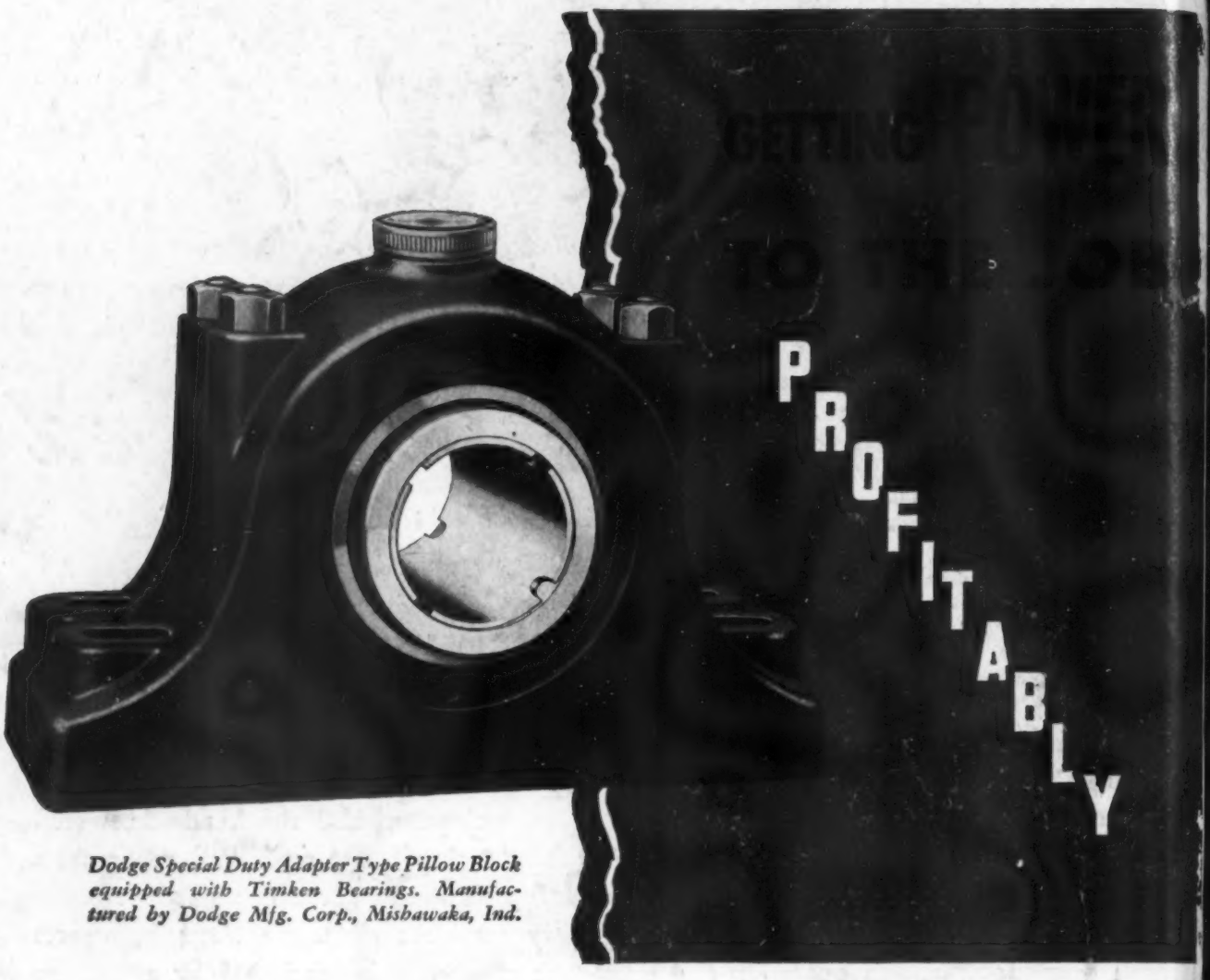

Dodge Special Duty Adapter Type Pillow Block equipped with Timken Bearings. Manufactured by Dodge Mfg. Corp., Mishawaka, Ind.

Power transmission equipment designed to take advantage of Timken Tapered Roller Bearings — like Dodge lineshaft hangers and pillow blocks for example — presents many economies to far-sighted plant managers.

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